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TRANSCRIPT OF RECORD.

SUPREME COURT OF THE UNITED STATES.

OCTOBER TERM, 1886.

~~No. 204.~~ 18

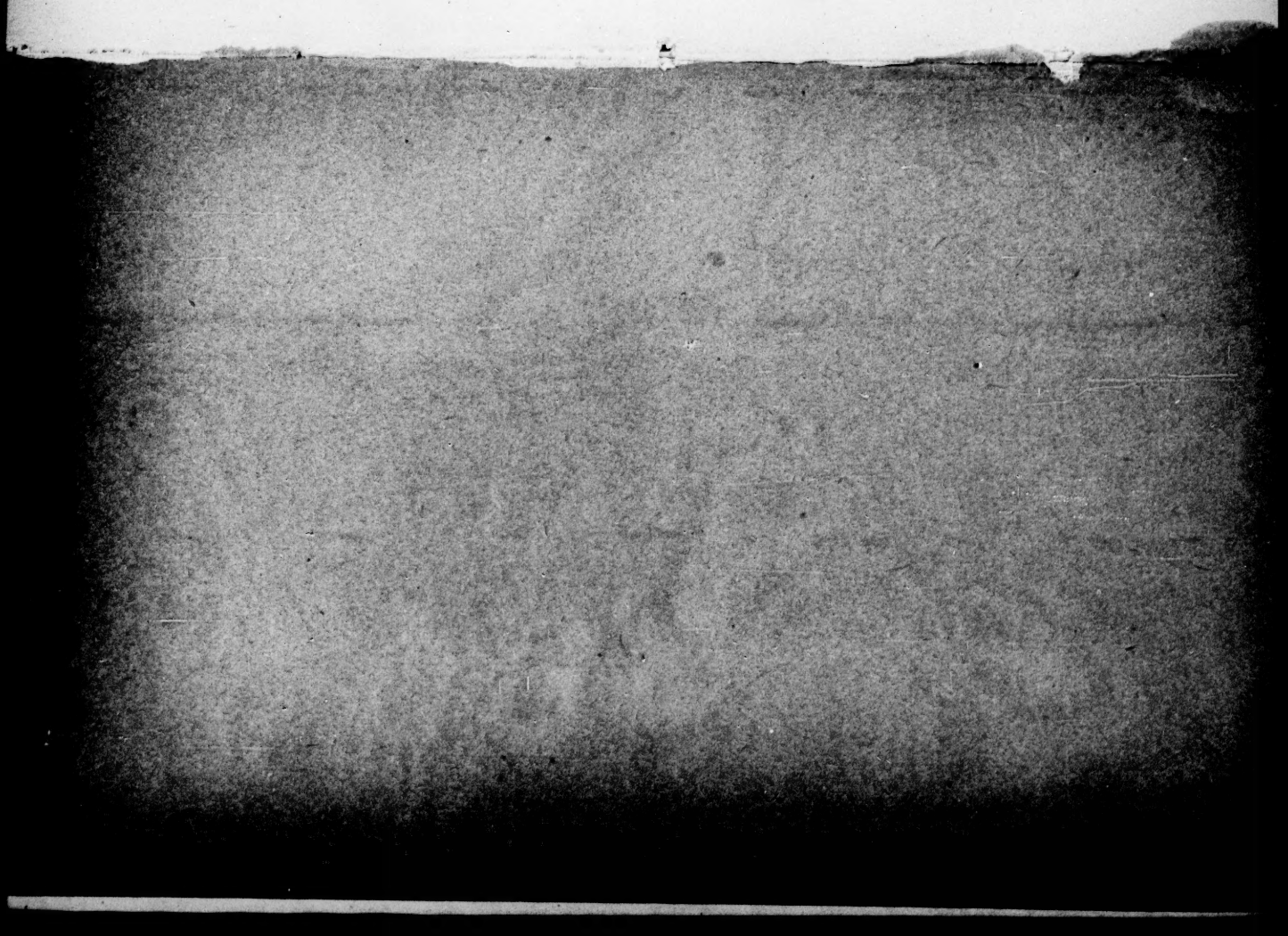
THE PARKER AND WHIPPLE COMPANY AND ARTHUR E. HOTCHKISS, APPELLANTS,

vs.

THE YALE CLOCK COMPANY AND HENRY C. SHELTON, FREDERICK A. LANE, AND PASCHAL CONVERSE.

APPEAL FROM THE CIRCUIT COURT OF THE UNITED STATES FOR THE DISTRICT OF CONNECTICUT.

FILED NOVEMBER 8, 1883.



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1, 2, & 3 Circuit Court of the United States, District of Connecticut.

THE PARKER & WHIPPLE COMPANY and ARTHUR E. HOTCHKISS

vs.

THE YALE CLOCK COMPANY and HENRY C. SHELTON, FREDERICK A. LANE, and PASCHAL CONVERSE.

To the honorable the Supreme Court of the United States:

The appeal of the Parker & Whipple Company and Arthur E. Hotchkiss, the above-named complainants and appellants, respectfully showeth:

That upon the 27th day of March, A. D. 1882, the above-named complainants filed their bill in the circuit court of the United States for the district of Connecticut against the above-named defendants and appellees, wherein they complained and showed that said Arthur E. Hotchkiss was the true, original, and first inventor of certain new and useful improvements in clock movements, for which he obtained letters patent of the United States dated November 4, 1879; that thereafter, for good and lawful cause, and without
4 laches or unlawful delay, and upon due surrender of said letters patent, petition, and compliance with all the statutes in such case made and provided, the Commissioner caused amended letters patent to be made out and delivered to said Hotchkiss, which said reissued letters patent were dated April 12, 1881, and numbered 9650; that thereafter, for like reasons and on like due and lawful proceedings, said reissued letters patent No. 9650 were surrendered by said Hotchkiss, and the Commissioner made out and delivered to him new and amended reissued letters patent, dated March 14, 1882, and numbered 10062; that prior to the date of said first-mentioned reissue the said Hotchkiss granted unto the said The Parker and Whipple Company the full and exclusive license to make, use, and sell said improvements under said original and reissued patents for the full term or terms thereof; that said improvements proved to be of great utility and advantage, and, but for the wrongful and unlawful infringement by the defendants herein, of great profit to the public and said complainants; that said defendants, being employed by said The Parker & Whipple Company to manufacture for them clock movements embodying said patented improve-
5 ments, did, in fraud of the rights of said complainants, use and appropriate the dies of said complainant- furnished to said defendant for, and only for, the purpose of said manufacture in the production of clock movements containing said improvements in all leading and essential features to be sold in the market in competition with the genuine Hotchkiss movement, and that despite the complainants' protest said infringements continue and threaten to continue.

Said bill also contained the usual prayer for relief by an accounting and paying over of profits and by preliminary and perpetual injunction.

To which said bill the defendants on the 30th day of June, A. D. 1882, filed their answer denying the validity of said reissued letters

patent; denying the patentable novelty in the alleged invention of Hotchkiss; denying any fraud in the use or duplication of said dies of complainants; denying the alleged infringement of Hotchkiss' invention, and denying that the complainants are entitled to the relief prayed for.

To this answer the usual replication was filed.

In conformity with the rules in such cases prescribed and
6 upon due notice, the evidence on behalf of both parties was taken before competent officers and submitted to said court, before which said cause was argued by counsel representing both parties on the 22d day of June, A. D. 1883.

That on the 2d day of October, A. D. 1883, a final decree was made and pronounced in the cause, wherein it was in substance adjudged and decreed that said reissued letters patent are invalid and that therefore the said bill should be dismissed.

Wherefore these appellants appeal from the whole of said decree of said circuit court of the United States and respectfully pray that the decree of the said circuit court and the bill, answer, pleadings, depositions, evidence, and proceedings in the said cause may be sent to the Supreme Court of the United States without delay, and that the said Supreme Court will proceed to hear the said cause anew and that the said decree of the circuit court and every part thereof may be reversed and a decree be made sustaining said bill, with costs, or such other decree as to the said Supreme Court shall seem just.

Dated at Hartford, Nov. 3, 1883.

CHARLES E. MITCHELL,
Solicitor for Complainant.

7 Circuit Court of the United States, District of Connecticut.
In Equity.

THE PARKER AND WHIPPLE COMPANY and ARTHUR E. HOTCHKISS

vs.

THE YALE CLOCK COMPANY and HENRY C. SHELTON, FREDERICK A. LANE, and PASCHAL CONVERSE.

Know all men by these presents that we, the Parker and Whipple Company, a joint stock corporation organized and existing under the laws of the State of Connecticut and located and having its principal place of business at Meriden, in said State, as principal, and Joseph H. Beckett, of said Meriden, and Ralph A. Palmer, of said Meriden, as sureties, are held and firmly bound unto the Yale Clock Company, a corporation organized and existing under the laws of the State of Connecticut, and located and having its principal place of business at New Haven in said State, and Henry C. Shelton, Frederick A. Lane, and Paschal Converse, all of said New Haven, in the sum of three hundred dollars, to be paid to the said The
8 Yale Clock Company, its successors and assigns, Henry C. Shelton, Frederick A. Lane, and Paschal Converse, their executors and administrators, and each and every of them; to which payment, well and truly to be made, we bind ourselves, and each of

us, jointly and severally, and our and each of our heirs, executors, and administrators, firmly by these presents. Sealed with our seals and dated the 3d day of November, A. D. 1883.

Whereas the above-named The Parker and Whipple Company hath prosecuted an appeal to the Supreme Court of the United States to reverse the decree rendered in the above-entitled action by the circuit court of the United States for the district of Connecticut:

Now, therefore, the condition of this obligation is such that if the above-named The Parker and Whipple Company shall prosecute its said appeal to effect and answer all damages and costs if it fail to make its plea good, then the above obligation shall be void; otherwise to remain in full force and virtue.

THE PARKER & WHIPPLE CO., [L. S.]
By JOHN PARKER, *President.* [L. S.]
JOSEPH H. BECKETT. [L. S.]
RALPH A. PALMER. [L. S.]

9 The above bond is approved and the appeal allowed.

N. SHIPMAN,
District Judge.

10 Circuit Court of the United States, District of Connecticut.
In Equity.

THE PARKER & WHIPPLE COMPANY and ARTHUR E. HOTCHKISS

vs.

THE YALE CLOCK COMPANY, HENRY C. SHELTON, FREDERICK A. LANE, and PASCHAL CONVERSE.

By the Hon. Nathaniel Shipman, one of the judges of the circuit court of the United States for the district of Connecticut.

To the Yale Clock Company, Henry C. Shelton, Frederick A. Lane, and Paschal Converse:

Whereas the Parker & Whipple Company and Arthur E. Hotchkiss have lately appealed to the Supreme Court of the United States from a decree lately rendered in the circuit court of the United States for the district of Connecticut, made in favor of you, the said The Yale Clock Company, Henry C. Shelton, Frederick A. Lane, and Paschal Converse, and has filed the security required by law, you are, therefore, hereby cited to appear before the said Supreme Court, at the city of Washington, on the 8th day of November, A. D. 1883, to do and receive what may appertain to justice to be done in the premises.

Given under my hand at the city of Hartford, in the district of Connecticut & second circuit, this 3rd day of November, A. D. 1883.

N. SHIPMAN,
One of the Judges of the Circuit Court of the U. S. for the District of Connecticut.

10½ NEW HAVEN, CONN., *Nov.* 3*d*, 1885.

Due service of the foregoing citation is hereby acknowledged.

C. R. INGERSOLL,
Sol. for Defendants.

10¾ *The Return of the Judges of the Circuit Court of the United States for the District of Connecticut to the Foregoing Appeal.*

THE PARKER & WHIPPLE CO. *et al.*
v.
THE YALE CLOCK CO. *et al.*

Be it remembered that on the 27th day of March, 1882, there was filed in court a bill in equity in the words and figures following, viz:

11 Circuit Court of the United States, District of Connecticut.
In Equity.

THE PARKER & WHIPPLE COMPANY and ARTHUR E. HOTCHKISS
vs.
THE YALE CLOCK COMPANY and HENRY C. SHELTON, FREDERICK A. LANE, and PASCHAL CONVERSE.

To the honorable the judges of the circuit court of the United States in and for the district of Connecticut:

The Parker & Whipple Company, a joint stock corporation organized under and pursuant to the laws of the State of Connecticut, and located and doing business at Meriden, in said State and district, and a citizen thereof, and Arthur E. Hotchkiss, of Cheshire, in said State and district, and a citizen thereof, bring this their bill of complaint against the Yale Clock Company, a corporation organized under and pursuant to the laws of the State of Connecticut, and located and doing business at New Haven, in said State and district, and a citizen thereof, and Henry C. Shelton, who is president of and a director in said corporation, and Frederick A. Lane, who is secretary of and a director in said company, and Paschal Converse, who is treasurer of and a director in said company, all residents of New Haven, in said State and district.

12 And thereupon your orators complain and show that prior to the 4th day of November, 1879, said Arthur E. Hotchkiss was the original and first inventor of certain new and useful improvements in clock movements not known or used by others before his said invention thereof, and which had not at the period of his application for a patent therefor been in public use or on sale with his consent or allowance for more than two years prior to his application for letters patent therefor, as your orators verily believe.

And your orators further show unto your honors that said Arthur E. Hotchkiss, so being the inventor of said improvement, made application to the Commissioner of Patents at the Patent Office of the United States for letters patent in conformity with the then existing laws of Congress, and thereupon due proceedings were had and all

the requirements of the statutes in such cases made and provided having been complied with, the said Commissioner caused letters patent to be made out and delivered to said Hotchkiss for the said improvement, which letters patent were duly signed and sealed and dated the 4th day of November, 1879, and granted and secured unto the said Hotchkiss and his heirs and assigns for the term of seventeen years from the date thereof the sole and exclusive right and liberty of making and using and vending the said invention.

And your orators further show unto your honors that thereafter, for good and lawful cause, and without laches or unlawful delay, the said Hotchkiss surrendered said original letters patent, and petitioned that the same should be reissued on an amended spec-

13 ification and claims; that due proceedings were had, and all the statutes in such case made and provided were complied with, and on the 12th day of April, 1881, the said Commissioner caused new and amended letters patent to be made out and delivered unto the said Arthur E. Hotchkiss, which said reissued letters patent were dated on the day and year last above written, and were duly signed and sealed, and were numbered 9650, and were intended to secure unto the said Hotchkiss and his heirs and assigns for the residue of said original term the sole and exclusive right and liberty of making, using, and vending the said invention and improvement.

And your orators further show unto your honors that thereafter, for good and lawful cause, and without laches or unlawful delay, on the 19th day of July, 1881, the said Hotchkiss surrendered said reissued letters patent and petitioned that the same should be reissued on an amended specification and claims; that due proceedings were had, and all the statutes in such case made and provided complied with, and on the 14th day of March, 1882, the said Commissioner caused new and amended letters patent to be made out and delivered unto the said Arthur E. Hotchkiss, which said reissued letters patent are dated the day and year last above written, and are duly signed and sealed, and are for the same invention as that described in said original letters patent and grant, and are numbered *number* 10062, and secured unto said Hotchkiss and his heirs and assigns for the residue of said original term the sole and exclusive right and liberty of making, using, and vending the said invention and improvement.

14 And your orators further show unto your honors that prior to the date of said first-mentioned reissue the said Hotchkiss granted unto the said Parker & Whipple Company the full and exclusive license, liberty, and authority to make, use, and sell said improvements in clock movements under said original and reissued letters patent for the full term or terms thereof, as by said license in writing or a duly certified copy thereof in court to be produced will appear; and your orators say that by reason of the premises they are entitled to bring this bill of complaint for the injury and infringement hereinafter set forth.

And your orators further show unto your honors that the said invention and improvement described and claimed in said reissued

letters patent, dated as aforesaid and numbered 10062, are of great benefit and advantage to your orators and to the public, and that your orators have spent large sums of money in and about said invention and improvements and in seeking to make the same of benefit and advantage to themselves and in attempting to introduce the same to public and general use, and that they have done so, and that they would, but for the wrongful and unlawful infringement by the defendants herein, make and secure large gains and profits therefrom, which are justly their due, but which are now received by the defendants herein.

And your orators further show unto your honors that after the granting of said letters patent the defendants were employed by the complainant, the Parker & Whipple Company, to manufacture for them, the said Parker & Whipple Company, clock movements
15 in large numbers containing and embodying the aforesaid invention of said Hotchkiss, the said complainant furnishing the dies necessary for the production of such movements to the defendants, and promising to pay and paying to the defendants a stipulated sum for said service; that the defendants entered upon such manufacture and made and delivered to the said complainant a large number of clock movements containing said invention, using in the production of the same the said dies belonging to the said complainant; that said defendant, being furnished with said dies for said purpose and for said purpose only, began soon after to use and duplicate the same to produce clock movements containing and appropriating said invention of said Hotchkiss in all of its leading and essential features for sale in the market or for use in clocks to be sold in the market in competition with the clock movements so made for the said complainant, and the complainants say that the appropriation and privacy of said invention of said Hotchkiss was by the using and duplication of said dies and by the knowledge obtained of said invention while so acting for the complainant made so complete that the wheels and pinions and other rotating parts of the movement made by the defendants for themselves in fraud of said invention are interchangeable with the wheels and pinions and other rotating parts so made for said complainants, and the complainants say that preparation for said manufacture in fraud of said invention and of the rights of complainants was at first concealed from your orators, but that since the discovery thereof by your orators they have ever remonstrated against the same.

16 Yet the said defendants, though well knowing the premises and the sole and exclusive rights of your orators, and though notified of their said infringement and requested to desist therefrom, have not desisted, but the said defendant corporation and said Henry C. Shelton, Frederick A. Lane, and Paschal Converse have jointly made, used, and sold, within said district of Connecticut and since said reissue last mentioned, No. 10062, large numbers of clocks and clock movements containing and embodying the invention described and claimed in said reissued letters patent No. 10062; and your orators have reason to fear and do fear that said defendants will in future jointly make, use, and sell other

large numbers of said clocks and clock movements embodying said invention to the great and irreparable loss and injury of your orators, and are thereby depriving your orators of great gains and profits justly their due, but which are now received by the defendants herein, and the defendants refuse to pay the same over to your orators.

And your orators further show unto your honors that they are able, ready, and willing to supply all the demands of the market for such improved clock movements.

To the end, therefore, that the said defendants may, if they can, show why your orators should not have the relief hereinafter prayed, and may under oath and according to the best and utmost of their knowledge, remembrance, information, and belief full, true, direct, and perfect answer make to all and singular the premises,
17 and may be decreed to account for and pay over to your orators all gains and profits realized by the infringement aforesaid, and also the damage suffered by your orators thereby, to be assessed as by statute provided, and may be restrained by a preliminary injunction, to be issued out of this honorable court, as by statute provided, against the defendants and each of them, their officers, agents, attorneys, clerks, servants, and employees, enjoining and restraining them from making, using, or vending any clock movements embodying said improvements, or any substantial part thereof, described and claimed in said reissue No. 10062, and also a writ of perpetual injunction so issued and so restraining and enjoining the said defendants and each of them, their officers, agents, attorneys, clerks, servants, and employees perpetually, and for such other and further relief in the premises as the nature of the case may require and to your honors may seem meet—

May it please your honors to grant unto your orators not only the writs of injunction conformable to the prayer of this bill, but also the writ of subpœna, to be directed to the said defendants, The Yale Clock Company, Henry C. Shelton, Frederick A. Lane and Paschal Converse, commanding them at a certain time and under a certain penalty therein to be limited personally to be and appear in this honorable court, then and there to answer the premises, and to do and receive what to your honors shall seem just and meet. And your orators as in duty bound will ever pray.

THE PARKER & WHIPPLE CO.
JOHN PARKER, *President.*
ARTHUR E. HOTCHKISS.

JOHN S. BEACH,
Solicitor and of Counsel.

18 UNITED STATES OF AMERICA, *District of Connecticut:*

At Meriden, in said district, on the 24th day of March, A. D. 1882, personally appeared John Parker, president of the Parker & Whipple Company, who, being by me duly sworn, deposeth and saith:

That he is president of the corporation complainant in the foregoing bill of complaint; that he has read the same and knows the

contents thereof; that the same is true of his own knowledge except as to those matters therein stated on information and belief, and as to those he believes it to be true.

[NOTARIAL SEAL.] RALPH A. PALMER,
Notary Public.

18½ And on the same day a writ of subpœna — issued out of court, directed to the said respondent, which was duly served and returned, and which, with the return of service endorsed thereon, is in the words and figures following, viz:

19 [SEAL.] The President of the United States of America to the marshal of the district of Connecticut sendeth greeting:

You are hereby commanded to summon The Yale Clock Company, a corporation organized under the laws of the State of Connecticut and located at New Haven, in said district, and Henry C. Shelton, who is president thereof and a director in said corporation, and Frederick A. Lane, who is secretary of and director in said corporation, and Paschal Converse, who is treasurer of and director in said corporation, all of New Haven, in the State and district of Connecticut, to appear before the judges of the circuit court of the United States of America for the district of Connecticut, in the second circuit, in equity, on the first Monday of May, 1882, wheresoever the said court shall then be, to answer a bill of complaint exhibited against said Yale Clock Company, Henry C. Shelton, Frederick A. Lane, and Paschal Converse in said court by The Parker & Whipple Company, a corporation organized under the statute laws of the State of Connecticut and located at Meriden, in said district, and Arthur E. Hotchkiss, of Cheshire, in said district, and then and there to answer the same and to do and abide by what said court may order and decree in the premises.

Make due service and return at least twenty days before said first Monday of May, 1882.

Witness the Hon. Morrison R. Waite, Chief Justice of the Supreme Court of the United States, at Hartford, this 27th day of March, A. D. 1882.

E. E. MARVIN, *Clerk.*

The defendants are required to enter their appearance in said cause in the clerk's office of said court on or before the day at which this writ is returnable, or, by the rules of said court, said bill will be taken as confessed.

E. E. MARVIN, *Clerk.*

JOHN S. BEACH,
Complainants' Solicitor.

19½ DISTRICT OF CONNECTICUT, *ss:*

NEW HAVEN, *March 28th*, 1882.

Then and there I made service of this writ by leaving a true and attested copy thereof in the hands of the secretary of the Yale Clock

Company and a like true and attested copy in the hands of Frederick A. Lane, Henry C. Shelton, and Paschal Converse, as herein directed.

Attest: GEO. R. BILL,
Deputy Marshal.

Fees:

4 services	$8 00
Copies	2 00
Travel, 40 miles	2 40
	$12 40

20 And one the same day John S. Beach, Esq., entered his appearance for the complainant-, and on the 30th day of June, 1882, C. R. Ingersoll, Esq., entered his appearance for the respondent-, and on the same day respondents' answer was filed in the words and figures following, viz:

21 United States Circuit Court, District of Connecticut. In Equity.

THE PARKER & WHIPPLE COMPANY *et al.*

vs.

THE YALE CLOCK COMPANY *et al.*

The answer of the Yale Clock Company and Henry C. Shelton, Frederick A. Lane, and Pascal Converse, defendants, to the bill of complaint of the Parker & Whipple Company, and Arthur E. Hotchkiss, complainants.

The said defendants, saving to themselves all benefit of exception to the errors and uncertainties of said bill of complaint, for answer thereunto, answering, say:

I. They are informed and believe that letters patent of the United States for an improvement in clock movements were, on the fourth day of November, 1879, granted to Arthur E. Hotchkiss, one of the complainants, and that thereafter the said Hotchkiss surrendered said letters patent, and on the 12th day of April, 1881, other letters patent bearing that date, being numbered 9650, were made out and delivered to him as reissued letters patent, and that thereafter said letters patent No. 9650 were surrendered by the said Hotch-
22 kiss, and on the 14th day of March, 1882, other letters patent bearing that date, and being numbered 10162, were made out and delivered to him as reissued letters patent.

II. But the defendants deny that either said original letters patent or said letters patent No. 9650 were so surrendered to the Commissioner of Patents for any good or lawful cause. On the contrary, they aver that said surrenders were made, respectively, for the purpose of claiming by the reissue of said letters patent inventions which were not claimed by said patentee in said original letters patent and which were not of his invention. And the defendant furthur avers that said original letters patent were not inoperative

or invalid by any reason whatever, and that said last reissued letters patent have been granted for claimed inventions which are not the same as the invention shown in the original letters patent, and that the claims of said original letters patent have been unlawfully broadened and expanded so as to cover improvements in clock movements not intended to be claimed in said original letters patent, and which had meanwhile been discovered and put into practice by others than the patentee, and that the said patentee has been guilty of such laches in his application to the Commissioner of Patents for said last reissued letters patent as to make *under* the grant of the same to him inequitable and unlawful. And therefore the defendant says that said last reissued letters patent, No. 10162, are void and of no effect.

III. The defendants, further answering, say that they have no information or belief as to the license under said letters patent
23 No. 10162, alleged to have been granted by the said Hotchkiss to the complainants and leave the complainants to make such proof thereof as they may be advised.

IV. The defendants, further answering, deny that there is anything of patentable novelty in the alleged invention of said Hotchkiss, and they aver that the said Hotchkiss was not the original and first inventor or discoverer of the improvements patented to him by said letters patent No. 10162, or of any material or substantial part thereof, but that, prior to his alleged invention or discovery thereof, the same had been described and publicly made known in the letters patent and the printed publications hereinafter mentioned, and that knowledge and use thereof prior to the alleged invention of said Hotchkiss was had by the persons and at the places hereinafter mentioned:

Letters patent of Great Britain to Henry Son, No. 1470, dated March 29, 1865.

Letters patent of Great Britain to Thomas Nelson, No. 9749, dated May 24, 1853.

Letters patent of Great Britain to John Peter Isaie Poncy, No. 8602, dated August 13, 1840.

Letters patent of Great Britain to Samuel Dansieth MacKellen, No. 1131, dated May 6, 1863.

Letters patent of Great Britain to Henry Carnegie Carden, No. 2899, dated November 11, 1865.

Letters patent of Great Britain to William Samuel Harrison, No. 2317, dated July 23, 1868.

Letters patent of United States to W. H. Lamb, No. 70724, dated November 12, 1867.

24 Letters patent of United States to E. W. Bridge, No 194,645, dated August 28, 1877.

Letters patent of United States to T. T. Fryer, No. 186,672, dated January 30, 1877.

Letters patent of United States to R. Hitchcock, No. 158,084, dated December 22, 1874.

Letters patent of United States to J. Beck, No. 77709, dated May 12, 1868.

Letters patent of United States to H. J. and W. D. Davies, No. 202,795, dated April 23, 1878.

Letters patent of United States to Laporte Hubbell, No. 51184, dated March 28, 1865.

F. A. Lane, A. B. Hendrick, Clark B. Bryant, Christian Reinhart, A. M. Johnson, Frederick Cook, all of New Haven, Connecticut, at Bristol in said State.

A. M. Lane, of Winsted, at said Bristol.

V. The defendants, further answering, say that they are now engaged in the manufacture of clocks and and clock movements in the city of New Haven containing and embodying the inventions patented to F. A. Lane by letters patent of the United States, dated ——; and they admit that before they engaged in such manufacture they had been employed by the complainants to manufacture, and by a certain contract with the complainants they did manufacture, for the complainants a quantity of clocks and clock movements containing features which the defendants understood to be claimed by the complainants as the invention of said Arthur E. Hotchkiss, and which were particularly specified and set forth in the original letters patent to said Hotchkiss hereinbefore referred to. But the defendants deny that they have, at any time, in the manufacture of the clocks
25 or clock movements containing the inventions of said Lane as aforesaid, used, duplicated, or in any manner appropriated any dies of the complainants, or have in any manner used or appropriated said invention of said Hotchkiss, or in any way conducted — in fraud of any rights of the complainant, as alleged in said bill. On the contrary, the defendants aver that they entered into the manufacture of their clocks and clock movements as aforesaid in full reliance upon the fact that said Hotchkiss had truly and fully set forth his alleged invention in respect of such manufacture in the letters patent taken out by him on the 4th day of November, 1879, and so believing and relying the defendants engaged in the manufacture of clocks of an entirely different construction from those made by them for the complainants and clearly outside of any claimed invention contained in said letters patent to said Hotchkiss, such construction being of the invention of said F. A. Lane before mentioned; and they have made a large investment in such business, and by reason of the superiority of their clocks, due to the said inventions of said Lane over the clocks so made by them for the complainants as aforesaid, they have been successful in such business; and they aver that it was because of such success and in consequence of the superior inventions of said Lane, and in fraud of the defendants' rights therein, and for the purpose of improving the defendants' business and investment so made as aforesaid, that the complainants and said Hotchkiss have obtained the present reissue of said original patent to said Hotchkiss and have sought to combine therein alleged inventions which were not comprised and were not intended to be comprised in said original patent, and which are not of the invention of said Hotchkiss.

26 VI. The defendants, further answering, say that the said

The Yale Clock Company, in their manufacture of clocks and clock movements under the letters patent to F. A. Lane, hereinbefore mentioned, have employed the methods and arrangements of parts described in said letters patent, but they deny that in such manufacture they have employed any methods or arrangement of parts which, upon any proper construction of the letters patent issued to the said Arthur E. Hotchkiss as aforesaid, are secured to the patentee therein, and they deny that they have, either jointly or severally, infringed upon any just rights of the complainant in any other manner.

VII. And the defendants, further answering, say that they deny that the complainants are entitled to any relief in the premises, and that the defendants should be hence dismissed with their reasonable costs and charges in this behalf most wrongfully sustained.

THE YALE CLOCK COMPANY,
By H. C. SHELTON, *President.*

STATE OF CONNECTICUT, }
New Haven, } *ss:*

JUNE 27, 1882.

Personally appeared H. C. Shelton, who made oath that he is the president of the Yale Clock Company, and that he has read the foregoing answer and knows the contents thereof, and that the same is true, except as to those matters stated on information and belief, and as to these he believes them to be true.

JOHN K. BEACH,
Notary Public.

C. R. INGERSOLL,
Solicitor & of Counsel for Defendants.

26½ And on the 11th day of September, 1882, complainants' replication was filed in the words and figures following, viz:

27 *Replication.*

U. S. Circuit Court, District of Connecticut. In Equity.

THE PARKER & WHIPPLE COMPANY *et al.*

v.

THE YALE CLOCK COMPANY *et al.*

The replication of The Parker & Whipple Company *et al.*, complainants, to the answer of The Yale Clock Company, *et al.*, defendants.

These repliants, saving and reserving at all times hereafter all and all manner of benefit and advantage of exception which may be had or taken to the manifold insufficiencies of the said answer, for replication thereunto say that they will aver, maintain, and prove their said bill of complainant to be true, certain, and sufficient in law to be answered unto, and that the said answer of the said defendants is uncertain, untrue, and insufficient to be replied unto by these repliants, without this, that any other matter or thing whatsoever in the

said answer contained material or effectual in the law to be replied unto, and not herein and hereby well and sufficiently replied unto, confessed or avoided, traversed or denied, is true.

All which matters and things these repliants are and will
28 be ready to aver, maintain, and prove as this honorable court shall direct, and humbly pray as in and by their said bill they have already prayed.

MITCHELL & HUNGERFORD,
Solicitors for Complainant-.

28½ And on the 22d day of June, 1883, complainants' and defendants' evidence was filed in the words and figures following, viz:

29 United States Circuit Court, District of Connecticut. In Equity.

THE PARKER & WHIPPLE CO. *et al.*
vs.
THE YALE CLOCK COMPANY *et al.*

Evidence for complainants taken under and pursuant to the 67th rule of the Supreme Court of the United States in equity as amended, before John B. Mills, notary public, pursuant to notice and by consent of parties.

NEW HAVEN, CONN.,
MONDAY, *October 2d*, 1882—10 o'clock, a. m.

Present: John S. Beach, Esq., Charles E. Mitchell, Esq., of counsel for complainants; Charles R. Ingersoll, Esq., S. Harrison Wagner, Esq., of counsel for defendants.

30 *Stipulation.*

It is stipulated and agreed between counsel for respective parties that the application for reissue No. 9656, granted to Arthur E. Hotchkiss, April 12, 1881, for improvement in clock movements was filed in the Patent Office Jan. 22, 1881, and that the application for reissue No. 10062, granted to said Hotchkiss on March 14, 1882, for improvements in clock movements was filed July 19, 1881.

C. R. INGERSOLL,
Of Defendants' Counsel.
C. E. MITCHELL,
Of Complainants' Counsel.

Complainants' counsel puts in evidence reissued letters patent of the United States issued to Arthur E. Hotchkiss, of Cheshire, Conn., for an alleged new and useful improvement in clock movements bearing date March 14, 1882, No. 10062.

It is agreed that a certified copy may be substituted for the original letters patent. The certified copy is put in evidence and marked Complainants' Exhibit "Complainants' Letters Patent," J. B. M., N. P.

Also certified duplicate of the Patent Office model in the matter of the said reissued letters patent, and the same is marked Complainants' Exhibit "Patent Office Model," J. B. M., N. P.

Deposition of James Shepard.

Direct examination by CHARLES E. MITCHELL, of counsel for the complainants:

Interrogatory 1. What is your name, age, residence, and occupation?

Answer. James Shepard; age, 44; residence, New Britain, Conn.; occupation, solicitor of patents, and I am also frequently called upon to testify as an expert in causes pertaining to patents.

Int. 2. What acquaintance have you with the art and business of clock making?

Ans. I formerly resided in Bristol, Conn., and have very frequently been through the clock shops of that place and wit-
31 nessed the manufacture of clocks; for over a year I was employed in a shop where mechanical movements quite similar to clock parts were made. My position in said shop was that of tool-maker, but I also was frequently employed on different parts of the movement and done all the gear cutting. I was also employed as tool-maker in a clock shop for several months. Since I have been a solicitor of patents I have prepared a large number of applications for patents for improvements in clocks, and I have also acted as expert in various causes in the U. S. circuit court when the patents in litigation related to clocks, and frequently during this time I have examined various treatises on clocks.

Int. 3. Have you read and do you understand reissued letters patent to Arthur E. Hotchkiss, No. 10062, for improvement in clock movements, dated March 14, 1882?

Ans. Yes to both branches of the question.

Int. 4. Describe what you understand to be the improvement in clock movements set forth in said reissued letters patent.

Ans. The object of the improvements is to arrange the several parts of the movement in such manner that they may be enclosed in a small and compact case, and at the same time so that they shall be durable in construction and made as cheaply as ordinary clock movements. To this end the main features of the invention may be stated generally to consist of dividing the train into two parts by means of a frame having three plates, the center shaft, which revolves once an hour, being longer than the rest of the shafts and extending into both divisions of the frame, the center pinion and the gears which drive it being located upon one side of the middle plate of the frame, and the center wheel, which revolves once an hour and carries the minute-hand, and which drives the remainder of the train, is arranged upon the opposite side of the said middle plate. The invention also consists of this center arbor carrying this center wheel and center pinion and three other wheels arranged between said center wheel and the escape wheel; also in arranging the three wheels which are driven by this center wheel in the circumference

of a circle which is concentric to the center arbor; also in arranging these three wheels on a semicircle concentric to the center
32 pinion, and combining them with the pendulum hung near the top of the frame, and swinging within the space upon the side of the center arbor which is opposite to the wheels arranged in a semicircle; also in the peculiar arrangement of the driving spring and the circular rack and disc carrying the planet wheel for imparting motion to the center arbor, and also in the peculiar construction of the pendulum rod and pendulum ball with a spring and adjusting nut.

The details of the construction consist of a rotating disc carrying a planet-wheel and taking its bearings in [the] back plate of the frame. The spring is attached to the hollow shaft or hub upon which this disc revolves. In front of the back plate is a circular rack, the teeth of which intermesh with the planet-wheel on the rotating disc; the center shaft or arbor takes its rear bearing in the hollow shaft or hub which carries the rotating disc, and thereby said shaft is supported and held in position by the rear plate. The front bearing of said center shaft is in the front plate of the frame. The center pinion mounted on the center shaft meshes into the planet-wheel and revolves once an hour. This center pinion and all the gears which drive it are between the middle plate of the frame and the rear plate, which two plates are connected together by means of the circular rack. This center pinion and the gears which drive it constitute one part or division of the train. Between the middle plate and the front plate of the frame all the other wheels are arranged. The center wheel is mounted on the center shaft in front of the middle plate and drives the rest of the train. The remainder of the train consists of three wheels and their pinions besides the escapement wheel, and its pinion mounted in the arc of a circle which is concentric to the center shaft, and they are all of the same size, so that they occupy substantially all of the space taken on radial lines from the center pinion to the outer edge of the movement. They are arranged mainly to one side of the center shaft, and the pendulum rod vibrates between the front and the middle plates of the frame upon the other side of said center shaft.

The specification says: "By the construction of the several parts of the movement and their arrangement as above described,
33 coarse teeth, large pinions and pivots, may be used, and will give as good results and occupy as little space as ordinary movements with fine and expensive work."

The verge and the dial wheels may be of any ordinary construction, and are not set forth as the invention which is particularly described in this patent. The center shaft is provided with a pinion upon the front side of the front plate for the purpose of driving the ordinary dial wheels in the ordinary manner.

Counsel for complainants put in evidence a clock which is marked Complainants' Exhibit Defendants' Clock, J. B. M., N. P., and which is admitted by defendants' counsel to be a clock manufactured by defendants and like clocks made and sold by defendants since the date of the reissue in suit and before filing the bill.

Int. 6. Have you examined and do you understand the construction and operation of the clock now before you, marked "Defendants' Clock?"

Ans. Yes; to both branches of the question.

Int. 7. Will you please compare the clock movement contained in the Exhibit "Defendants' Clock" with the improvement in clock movements described in the Hotchkiss reissue, pointing out resemblances and differences, and state to what extent, if any, in your opinion, the said movement of defendants embodies the improvements described and claimed in said Hotchkiss reissue?

Ans. The "defendants' clock" resembles that shown, described, and claimed in the Hotchkiss patent in the fact that the movement is divided into two parts and mounted in a three-plate frame, with the center shaft made longer than the others and supported in its position by the front and rear plates of the frame, and having the center pinion and the gears which drive it upon one side of the middle plate of the frame, and the center wheel and the rest of the train which is driven by it upon the other side of said middle plate, substantially as referred to in the first four claims of the Hotchkiss patent; also in the fact that it has the center arbor carrying the center wheel and center pinion and between said center wheel and the escape-
34 ment wheel three other wheels suitably fastened on arbors carrying pinions, substantially as referred to in the fifth claim of said patent; also in the fact that said three wheels last mentioned in connection with the center arbor carrying pinion and center wheel are arranged with their pivots in the respective plates in the circumferences of circles concentric with the center arbor, said three wheels and pinions being all substantially of the same diameters, as specially referred to in the sixth claim of said patent; also in the fact that said three wheels and their pivots are arranged in connection with said center wheel and pinion in a semicircle by the side of said center pinion substantially as specified in the seventh claim of said patent; also in the fact that the train divided into two parts and having the wheels arranged in the semicircle concentric to the center wheel and center pinion, as before stated, and having the escape wheel arranged in the front division of the train near the top of the frame and with the pendulum vibrating in the plane between the front and middle plates of the frame, substantially as referred to in the eighth claim of said patent. For a more specific description: All that division of the train in "defendants' clock" which is in front of the middle plate of the frame is substantially identical with the same parts shown and described in the Hotchkiss patent. The "defendants' clock" in this part of the movement differs from that described in the Hotchkiss patent by a different manner of hanging the verge, but this difference I consider immaterial, because the Hotchkiss patent does not set forth that feature as peculiar to the patented invention, and for the further fact that the arrangement of the train is precisely the same, independent of the manner of hanging the verge, or, in other words, the manner of hanging the verge does not in any manner alter or affect the arrangement of the wheels for imparting an impulse to it. The verge in "defendants' clock," however, is ar-

ranged in precisely the same position in the frame relatively to the wheels as shown and described in the Hotchkiss patent, and the pendulum sustains the same relation to this part of the train. The rear division of the train in the "defendants' clock" consists of the center pinion and one large main wheel meshing directly into it. The rear plate assists to support this main wheel in position
35 and also it supports the rear end of the center arbor. In the arrangement of the main wheel it is different from the circular rack disc and planet wheel of the Hotchkiss patent, and for that reason does not contain the parts specially referred to in the ninth claim of the Hotchkiss patent, neither does it appear to contain the construction referred to in the tenth claim of said patent. These differences, however, I consider immaterial to the other parts of the invention described in the said Hotchkiss patent, because it still contains the same general division of the train into two parts sustaining the same relations to a three-plate frame, and because also the front part of the frame can in nowise be affected or altered by this change of the driving mechanism. For these reasons I am of the opinion that the "defendants' clock" fully and completely embodies the improvements shown and described in the Hotchkiss reissue and particularly referred to in the first eight claims thereof, and it performs the same function by substantially the same means and in the same way.

Int. 8. Have you an exhibit illustrating the extent to which the "defendants' clock" copies the arrangement and construction of the clocks made in accordance with the Hotchkiss reissue? If so, produce and describe the same.

Ans. I have and herewith produce them. (Producing two clocks.)

The two clocks produced by the witness are placed in evidence and marked Complainants' Exhibits—Exhibits Shepard A and B, J. B. M., N. P.

(Witness continues.)

The Complainants' Exhibit "Shepard A" is, as I understand it, a clock manufactured under the Hotchkiss reissue, with the exception that all of that portion of the train outside of the center wheel and which is in front of the middle plate of the frame has been removed, and the corresponding portions of one of the defendants' clocks has been substituted in place thereof, and with this change the Exhibit "Shepard A" was brought to its present condition. Exhibit
36 "Shepard B" is the defendants' clock from which the parts were taken to put into Exhibit "Shepard A," and the parts which were taken from the latter exhibit are now in Exhibit "Shepard B." These changes were made in my presence and both of the clocks run and operate just the same as before the change was made.

Int. 9. Please enumerate the parts which were required to be interchangeable with each other in order that the substitution might be effected that has been made in the two clocks of the Shepard exhibits.

Ans. The escapement wheel and the three wheels which are

between it and the center wheel and the pinions of said wheels all have to be made to correspond in size and shape and in the number of teeth to the size of their pivots and the length of the shafts between the pivots. The middle plate and the front plate have to correspond exactly in what might be called the layout of the frame, so as to bring all of the wheels and their pivots in the same position relative to the center wheel. The teeth of the escapement wheels have to correspond in order to be interchanged without interchanging the verge. The pillars which regulate the distance between the middle and front plate have to correspond.

Int. 10. Basing your opinion upon your experience, state whether or not the interchangeability of parts which you have pointed out could or would have taken place without intentional copying one from the other.

Ans. In my opinion, it would not.

Int. 11. State whether or not these interchangeable parts or some of them enter into each and all of the eight claims whose subject-matter you find embodied in defendants' movement.

Ans. They enter into all of them, to a greater or lesser extent.

(Cross-examination waived.)

JAMES SHEPARD.

Attest: JOHN B. MILLS, *N. P.*

Hearing adjourned until Friday, October 6th, 1882, at 10 o'clock a. m.

37 *Deposition of M. L. Roys.*

NEW HAVEN, CONN.,
FRIDAY, *October 6th*, 1882.—10 o'clock a. m.

Counsel present as before.

Direct examination by JOHN S. BEACH, Esq., of counsel for complanant:

Int. 1. What is your name, age, residence, and occupation?

Ans. M. L. Roys; age, 26; residence, Meriden, Ct.; occupation, clock-maker, now in the employ of Parker & Whipple Co.

Int. 2. Were you ever in the employment of the Yale Clock Co. of New Haven, defendants in this cause?

A. Yes, sir; I was.

Int. 3. When did you go into their employment, and when did you leave it?

Ans. I went into their employment March 4th, 1880, and remained two years and about two months.

Int. 4. Were you at any time during that period employed in fitting clock movements in the factory of the defendants of a clock known as the "Hotchkiss" or "Little Jewel" clock?

Ans. Yes, sir.

Int. 5. At what period of that time were you so employed on the "Hotchkiss" clock?

Ans. I commenced on them about the last of June, 1880.

Int. 6. And when did the company substantially cease to manufacture those clocks under that name?

Ans. About the 1st of January, 1881.

Int. 7. On what part of the movements of the "Little Jewel" or "Hotchkiss" clock were you employed?

Ans. I had the front plates to fit up.

Int. 8. What did the fitting up of the front plates include?

Ans. Putting on the dial-wheel and putting on the steels.

Int. 9. To what extent did your part of the work call for an inspection and a knowledge of the other parts of the movement and their operation?

38 Ans. I had to see that the center was properly meshed onto the first wheel of the train in order to make my work right.

Int. 10. And did or not that involve an inspection and knowledge of the other wheels and their relative motions?

Ans. Yes, sir; it did.

Int. 11. Will you please look at the clock now shown you, which is marked Complainants' Exhibit "Defendants' Clock," and say whether the Yale Clock Co., while you were in their employment, manufactured a clock like that exhibit?

Ans. They did, sir.

Int. 12. By what name was it known in the shop?

Ans. "Yale Gem," or "Little Gem" some called it.

Int. 13. When did the defendants first begin to make this so-called "Gem" clock?

Ans. They made a few of them before the 1st of January, 1881.

Int. 14. About how many, as nearly as you can state it, did they make before the 1st of January, 1881?

Ans. About a hundred—more or less.

Int. 15. Can you tell me how many they made during the month of January, 1881?

Ans. About sixteen hundred.

Int. 16. What, if anything, did you have to do with the fitting up of the movements of these "Gem" clocks you have spoken of in your last two answers?

Ans. I had about the same part as the "Jewel."

Int. 17. How did the facilities you had [for] and inspection and knowledge of the movements of these little "Gem" clocks compare with the facilities you had for an inspection and knowledge of the movements of the "Little Jewel" clock, of which you have spoken?

Ans. The same, or about the same.

Int. 18. Restricting your answer for the present to the hundred movements, more or less, fitted by you prior to 1st of January, 1881, will you please compare the movements of the "Gem" and "Jewel" clocks, so called, and say to what extent, if at all, they differed, and in what that difference, if any, consisted as to the ratchet and main wheels in each?

39 Ans. The difference between the "Gem" and "Jewel" in the ratchet wheel was it was below the center in the "Gem" instead of being in back, as it was in the "Jewel."

Int. 19. The same question as to the centers in the two clocks; what was the difference, if any, and what was it?

Ans. The center in the "Little Gem" was longer and had a filled shuck pinion; on the "Little Jewel" was shorter and had a cut shuck pinion.

Int. 20. Same question as to their verges.

Ans. The difference in the verges was that the "Gem" had a solid steel verge and the "Jewel" had what they called in the shop a soldered verge.

Int. 21. The same question as to their verge buttons.

Ans. The verge buttons on the "Gems" were pressed of brass and the hole drilled in them for a pivot. The others were of steel with a vertical point in them for the verge shaft to rest in.

Int. 22. What other differences of construction do you now recall?

Ans. There was no other differences between the front and middle plate, only the center, at that time.

Int. 23. Do you mean by differences on the center, in your last answer, the differences to which you have already referred in answer to the 19th Interrogatory, to wit, the differences in the lengths of the centers and in the construction of their shuck pinions?

Ans. Yes, sir; and that there was a click and ratchet on the Hotchkiss clock that was not on the "Gem," and all the difference in fitting on these that I could see was that the washer, instead of being on top of the center, was below the center wheel between the click and the wheel.

Int. 24. Have you now stated all the features that you recall in which the two clocks differed in their construction?

Ans. No, sir; I have not, because the front plate was a different shape; and there was a middle plate which was not on the "Little Jewel." There was a middle plate on the "Little Jewel," but it was a different size, a different shape, or back plate some called it.

Int. 25. Was there any other feature of difference which you now recall?

Ans. Yes, sir; there was.

Int. 26. Please state it, and at the same time add any others to which you have not already called our attention.

Ans. Well, that consisted in the two lower pillars in the "Gem" being wider apart than those in the "Jewel." I believe that is all; I see no more points of difference between the front and middle plate.

Int. 27. Are all these features of difference of which you have spoken to be found in the exhibit to which your attention has been called as being Exhibit "Defendants' Clock?"

Ans. Yes, sir.

Int. 28. Calling your attention first to the hundred movements, more or less, of the "Little Gem" you fitted before the 1st of January, 1881, and especially to that part of the mechanism between the front and the middle plate of the frame, will you state to what extent these hundred movements, more or less, were like the corre-

sponding parts in the "Little Jewel" or "Hotchkiss Clock" as then made by the defendants?

A. The train was just alike, as far as I could see. The dial wheel was the same.

Int. 29. State what means of knowledge you have as to these hundred movements, more or less, being alike in the two clocks, so far as relates to the mechanism between the middle and front plate of the frame.

Ans. Well, I had the parts to fit up ready for putting in the train and the front plate to fit up, and to see that the center properly meshed onto the first wheel, and that gave me a knowledge of the train.

Int. 30. I am speaking now of the hundred movements, more or less, which you fitted prior to the 1st January, 1881. Can you state any fact within your own knowledge or observation tending to show a similarity of movements between the two clocks as made by the defendants prior to the 1st January?

Ans. Yes, sir.

Int. 31. Please state it.

Ans. The same train would go in either clock and the appearances of the plates that they were pricked off the same, and the pillars were turned to fasten the front plate on the same as in the
41 "Jewel," and the dial wheel was the same—same number of teeth in [it], and just the same; no difference made in fitting up the dial wheels for the "Gem," and the shuck that went on the center outside of the center was the same. It was a pressed shuck. The end of the center was the same and used the same hands on them.

Int. 32. Did you see any of these hundred movements, more or less, while they were being assembled by the workmen?

Ans. Certainly I did; I was at work on them.

Int. 33. Did you see the assembling of that part of the mechanism between the middle plate and the front plate while it was being done in any or either of these hundred movements made before the 1st January?

Ans. Yes, sir.

Int. 34. Did the same operator who assembled these hundred movements, more or less, of the mechanism between the front and the middle plate also assemble the corresponding mechanism in the "Hotchkiss" clocks?

Ans. Yes, sir.

Int. 35. Where did the operator, during the assembling of the mechanism in the "Hotchkiss" clock, find his wheels necessary to constitute the train—I mean were they near to him in a box, or something of that sort?

Ans. They were, sir; they had a regular tray for putting them in, with partitions for each wheel dividing them off.

Int. 36. And where did this operator, in assembling the mechanism of the hundred movements, more or less, lying between the front and middle plate, find his wheels to make up the train?

Ans. They were fitted up by a wheel-fitter and placed in this box before the operator, ready for use.

Int. 37. Do you mean as to these hundred movements, more or less, of the Little Gem made prior to January, 1881, that the operator, while assembling this part of the mechanism in the Hotchkiss clock, used the same tray or a different tray containing wheels from that which he used while assembling these hundred movements of the "Little Gem?"

Ans. He used them out of the same tray.

Int. 38. You say the defendant company ceased to make the "Hotchkiss" or "Little Jewel" clock, as such, about the 1st
42 of January, 1881, and thereafter made the clock known as the "Little Gem." What difference, if any, did you detect between the train of wheels which are in front of the middle plate and in rear of the front plate, as made and used by the defendant company after the 1st of January and those used in the hundred movements, more or less, made prior to the 1st of January, 1881, either in the size of the wheels, the number of teeth in each, their relative adjustment to each other, or otherwise.

Ans. I saw no difference, and there was no difference that I could see.

Int. 39. Did all the movements made by the defendant company after the 1st of January, 1881, and up to the time you left, in April, 1882, come under your personal inspection?

Ans. I saw them all. They all passed through my hands.

Int. 40. How were these wheels which formed the mechanism between the front and middle plate made and shaped as to size—I mean what instrumentality was used to give them their required shape and size?

Ans. They were pressed out with a die or punch.

Int. 41. Have you any personal knowledge as to the dies used for the wheels, either in the "Jewel" or the "Gem" clocks, as to whether the dies used were the same for each, or, if not the same, duplicates of each other?

Ans. I have no personal knowledge of that.

Int. 42. Who had charge of the dies and punches used for pressing the wheels into shape during the fall of 1880 and up to the time you left, in April, 1882?

Ans. Will Hausman.

Int. 43. Where does he now reside, if you know?

Ans. New Haven.

Int. 44. And in whose employment do you understand him to be now engaged?

Ans. Yale Clock Co.

Int. 45. Who was the head machinist of the Yale Clock Co. during the same period?

Ans. Mr. Cook. I think his first name was Frederick.

Int. 46. Where does he reside and in whose employment do you understand him to be?

43 Ans. He resides in New Haven, and is in the employment the Yale Clock Co.

Int. 47. Do you know Frederick A. Lane?

Ans. Yes, sir.

Int. 48. Was he in the employment of the defendant company during the period when you were there?

Ans. He was.

Int. 49. And was he so in their employment during the fall of 1880 and the winter of 1881?

Ans. Yes, sir.

Int. 50. In what capacity was Mr. Lane acting at this time?

Ans. As superintendent to the shop.

Cross-examination by C. R. INGERSOLL, Esq., of counsel for defendants:

Cr. Int. 51. What do you understand by "the train" of a clock?

Ans. It is the wheels that take the power from the center; the trains of that clock, the only clock I knew anything about, and the "Jewel" *and the trains* were both the same at that time.

Cr. Int. 52. Specify the different wheels that were comprised in the trains of those two clocks, as you understand them, which were the same.

Ans. There was the first wheel, which meshed on to the center, the second wheel, the third and crown, called by some the verge wheel.

Cr. Int. 53. Then, where in your examination you have used the term train of wheels, you have intended a train of wheels composed of those that you have just specified, is that so?

Ans. The train of wheels inside of the middle and front plate.

Cr. Int. 54. By middle plate do you mean the plate next in rear of the front plate?

Ans. Yes, sir; I do, if you mean the "Gem."

Cr. Int. 55. In your answer to cr. int. 52 you mention "the first wheel which meshed onto the center." Do you not mean the first wheel upon which the center meshed?

44 Ans. I think you can employ that term both ways, as I understand it; I mean the first wheel in front of the center inside the front and middle plate.

Cr. Int. 56. How long have you been in the employ of the complainant company?

Ans. Not quite three weeks.

Cr. Int. 57. During the period in which you were employed, as you have testified, in putting together the so-called "Jewel" clock was the Yale Clock Co. engaged in the manufacture of other kinds of clocks?

Ans. Yes, sir.

M. L. ROYS.

Attest: JOHN B. MILLS, *Notary Public.*

Deposition of Theodore F. Breese.

Direct examination by CHARLES E. MITCHELL, Esq., of counsel for the complainants:

Int. 1. What is your name, age, residence, and occupation?

Ans. Theodore F. Breese; age, 53; residence, Meriden, Ct.; occupation, manufacturer. I am treasurer of the Parker & Whipple Company.

Counsel for complainants place in evidence an agreement between the Yale Clock Co. and the Parker & Whipple Co., dated March 6, 1880, the execution of which is admitted, which is marked Complainants' Exhibit "Yale Agreement," J. B. M., N. P., and it is agreed that a copy thereof may be at any time substituted therefor.

Int. 2. Were you treasurer of Parker & Whipple at the date of the agreement now shown you, marked Exhibit "Yale Agreement?"

Ans. I was.

Int. 3. State whether a sample clock was furnished to the Yale Clock Co. by the Parker & Whipple Co., as stated in the agreement referred to.

45 Ans. There was.

Int. 4. State whether or not the sample clock so furnished was one of the kind known in this case as the "Hotchkiss" or "Little Jewel" clock.

Ans. It was.

Int. 5. One clause of this agreement provides that the Parker & Whipple Co. shall furnish the dies and cutters necessary to make the clock movements called for by said agreement. Please state whether or not such dies and cutters were furnished by Parker & Whipple to the defendants.

Ans. They were.

Int. 6. Why were such dies and cutters furnished by Parker & Whipple?

Ans. Because the defendants had not any.

Int. 7. When did the defendants begin to deliver movements under this agreement?

Ans. I believe it was about the 1st of July.

Int. 8. State whether or not the dies furnished to the Yale Clock Co. were the property of Parker & Whipple, and whether they were returned to Parker & Whipple at some time after the Yale Clock Co. ceased to deliver movements.

Ans. They were; to both branches of the question.

(No cross-examination.)

T. F. BREESE.

Attest: JOHN B. MILLS, *Notary Public.*

Counsel for complainants put in evidence certified copy of agreement between Arthur E. Hotchkiss and the Parker & Whipple Co., bearing date the 2d day of January, 1880, and recorded in the United

States Patent Office, liber E 25, page 295, and the same is marked Complainants' Exhibit "License Agreement," J. B. M., N. P.

Complainants rest.

46 United States Circuit Court, District of Connecticut. In Equity.

THE PARKER & WHIPPLE CO. *et al.*
vs.
THE YALE CLOCK CO. *et al.*

I, John B. Mills, a notary public in and for the State of Connecticut, do certify that the foregoing depositions were taken before me upon the days in the body of the said depositions named, to be used on the part of the complainants in the above-entitled suit; that said depositions were reduced to writing by me in the presence of and from the statements of the witnesses who subscribed said depositions and in the presence of the counsel for the respective parties.

That the witnesses were duly cautioned and sworn and subscribed the said depositions before me.

That I am not of counsel or attorney for either of the parties in said depositions and caption named, or in any way interested in the events of said cause named in said caption.

In testimony whereof I have hereunto set my hand and seal this 6th day of October, A. D. 1882.

[SEAL.] JOHN B. MILLS,
Notary Public.

47 *Complainants' Evidence in Rebuttal.*

NEW HAVEN, *February* 20, 1883—10 o'clock a. m.

Present: John S. Beach and Charles E. Mitchell, Esqrs., of counsel for complainants, and Chas. R. Ingersoll and S. Harrison Wagner, Esqrs., of counsel for defendants.

It is admitted that the defendants' exhibit, "Everitt clock," was made and used before the invention of the Hotchkiss clock, the complainants reserving the right to withdraw the admission, in which case the defendants are to have reasonable time thereafter in which to make proof.

Deposition of James Shepard.

Direct examination by CHARLES E. MITCHELL, Esq., of counsel for complainants:

Interrogatory 1. Are you the James Shepard who has heretofore testified in this case?

Answer. I am.

Int. 2. Have you read and do you understand the testimony of defendants' expert, Mr. John E. Earle, in this case?

Ans. I have read said testimony, and believe that I understand the same.

Int. 3. Mr. Earle is understood to say, for substance, that in the Hotchkiss clock, described in the letters patent in suit, it is an

essential feature that the train is and must be disconnected—
48 that is to say, the center wheel and center pinion must be independent of each other on the center shaft in order to contain his invention; please say whether or not you dissent from Mr. Earle in that matter and give your reasons for your conclusions.

Ans. I do not agree with Mr. Earle in this matter. First, for the reason that the patent nowhere describes the two parts of the train as disconnected; on the contrary, the patent clearly sets forth the fact that the two parts of the train are connected, and it particularly points out the specific means by which the front part of the train and the back part of the train are connected, as follows, referring to said parts of the train: "The two parts being connected by the center arbor H, on which are arranged the center wheel and center pinion, and which extends through the front plate and middle plate to the hub 'G' in the back plate." From this it will be seen that, instead of a disconnected train being essential to the Hotchkiss invention, the patent appears to make essential a train divided into two parts, which are connected by the center arbor. Second, the patent, in referring to the two parts of the train, uniformly speaks of them as divided, but connected, and nowhere does it say or imply that the train is disconnected at any point. It is true, however, that the center wheel and center pinion are arranged loosely upon the center shaft, the center wheel having frictional contact, and the center wheel and center pinion being connected by the center arbor, and for the purpose of driving the train they are further connected by means of a ratchet wheel and pawl.

Int. 4. State whether or not you find in the specification of the Hotchkiss patent a statement or definition of the sense in which he uses the word "divided" therein; and, if so, please quote it.

Ans. I do; it is as follows: "I am aware that the frames of movements have been made with the plates adapted to secure particular results, and I am aware that the trains of movements have been divided (in the sense in which I use the word—that is, parts of trains have been arranged between different plates, but not disconnected)."

From which it will be seen that the division referred to in the
49 patent, in the sense in which he uses the word, is the dividing of the train into a front and rear part by means of plates, the middle one of which is a division plate, but that these trains when so divided are connected. As a statement of what is old, I understand this to say, in substance, that connected trains had been before divided by arranging them between different plates.

Int. 5. State whether you consider it in any way material to the inventions specified in the several claims of the Hotchkiss patent whether or not the center pinion has a capacity of rotating backwards in the act of winding the clock.

Ans. I do not, because that function is not particularly pointed out in the patent as essential, and, further, because it makes no difference whatever to the operation of the Hotchkiss clock whether the ratchet wheel and pawl are located between the center wheel and center pinion or whether they are located back of the revolving disc, except that, in the mere act of winding, the center pinion,

planet wheel, and disc would remain stationary instead of turning backwards. As a clock, it would be substantially the same, and clearly within all the claims of the Hotchkiss patent, notwithstanding the change in the location of the ratchet. In my opinion this change in the location of the ratchet is not referred to in any of the claims and is wholly immaterial to each of them.

Int. 6. State whether or not it is any way material to the organization or operation of the defendants' clock that the ratchet and pawl connection should be upon the main shaft rather than upon the center shaft, giving reasons.

Ans. It is not; the ratchet might just as well be located on the center shaft, as shown in the Hotchkiss patent, and when so located there would be no substantial change in the organization of the clock or in its mode of operation. In winding, the main wheel and center pinion would move backwards, but the clock as a clock would perform its functions as before, and it would require no reorganization of any of the parts of the clock except merely to change the location of the ratchet and its appurtenances from the main shaft to the center shaft.

Int. 7. What do you understand to be, mechanically speaking, the object of aparting the two portions of the connected train of Hotchkiss' movement to different sides of the middle plate?

50 Ans. It is to so distribute the different parts of the train that a clock movement may be made which shall be simple and durable in its construction, which can be made at a small cost, and which may be enclosed in a small and compact case. This is accomplished by dividing the train at a point between the center wheel and center pinion, and then connected to the front and rear parts of the divided train by the center arbor, which reaches into both divisions of the frame.

Int. 8. State whether or not the same object is accomplished in the defendants' clock in the same way and by the same mechanical means, and give reasons.

Ans. It is. The train is divided in the same sense, at the same point, and by the same means, and the parts of the divided tran are connected in the same way by means of the center arbor, which extends into both divisions of the train. The front part of the defendants' train is substantially identical with the front part of the Hotchkiss train, and the rear part of the train was a known substitute at the date of the Hotchkiss patent for the part of the train which is in the rear of the center wheel, and the means of connecting the two parts of the train, as I have before said, are the same as the means of connecting the train in the Hotchkiss patent.

Int. 8. What is the mechanical object of connecting the two parts of the train by the center arbor extending into both apartments of the frame in the Hotchkiss patent?

Ans. The center arbor of the Hotchkiss patent is the one which carries the minute hand, and necessarily this must be in or must extend to the front part of the train. This is also, in the Hotchkiss patent, the arbor which bears the center wheel and center pinion that forms a part of the train, and consequently it extends into the

rear part of the frame in order to be connected with the driving power; furthermore, it enables the center arbor and pointers to be turned by applying the key to the rear end of the center arbor and from the back of the clock. So far as I know no train divided into two parts ever before had the center arbor and pointers so arranged as to be operated for setting from the back of the clock.

Int. 9. State whether or not, in defendants' "Lane clock," the same mechanical objects are secured by the same means as
51 stated in your last answer with reference to the Hotchkiss clock.

Ans. They are.

Int. 10. Mr. Lane, in reply to int. 32 of his deposition, says, for substance, that he removed what he considered the imperfections in the Hotchkiss or Parker-Whipple clock by employing, in place of what he calls "the complicated mechanism of the internal gear of the Parker & Whipple clock," the "main wheel common to all common clocks;" state whether you agree with him in whole or part, and give reasons.

Ans. I agree with him in the fact that he substituted in place of the circular rack and planet-wheel the main wheel of common clocks. The main wheel of the "Lane clock" is one that was well known at the date of the Hotchkiss patent, and this substitution of the main wheel for the rack and planet wheel is practically the only change in the "Lane clock" over that of the Hotchkiss patent; that is to say, the other parts of the clock are the same as the Hotchkiss clock.

Int. 11. Was there, in your opinion, any invention in employing the substitute, as stated in your last answer?

Ans. There was not.

Int. 12. Mr. Earle, in reply to the 6th int. of his deposition, states that there would not, in his opinion, be any invention in the arrangement of parts described in either of the first four claims of the Hotchkiss patent, without the element of the division of the train, as he understands that division, and as he has described it in his deposition. State whether you agree with him; give your reasons, referring especially to the reasons given by him in his answer.

Ans. I do not agree with Mr Earle in this particular, for the reason that the division of the train, as set forth by him, is dependent upon the location of the ratchet wheel, and this feature, in my opinion, has nothing whatever to do with the matters specified in the first four claims, and consequently it has no bearing, to my mind, on the question of invention. It seems to me that the division of the train, as set forth in said first four claims, involves invention, because it is not an obvious matter; it appears to be both new and useful, and inasmuch as clock-makers are always ready to
52 adopt any new and useful improvement, and inasmuch as this was not known before the Hotchkiss invention, it seems to me that something more than mechanical skill and good judgment must have been necessary in order to produce it, for if it had been useful and obvious, or could have been produced without in-

vention, other mechanics would undoubtedly have produced it. I understand the reasons of Mr. Earle, that there is no invention in the subject-matter of the first four claims of the Hotchkiss patent, to reside principally in the fact that such claims were old, as shown by the disclaimer in the Hotchkiss patent, which he understands to disclaim the subject-matter of the first four claims, unless the location of the ratchet wheel is construed into them. I do not understand the disclaimer to make any such acknowledgement, and consequently I cannot agree in his reasons for concluding that there would be no invention in the first four claims, because Mr. Earle assumes that they are old, unless the peculiar location of the ratchet is considered.

Int. 13. Mr. Earle, in his reply to int. 9, states that the rear plate (if it may be so called) in the Hotchkiss clock is the revolving disc which carries the "planet wheel." Again, in reply to int. 16, he says: "The third plate, if any there be, must be the circular rack." State whether you agree with him in either of these opinions.

Ans. I do not, because a circular rack is not a plate in any sense of the word. The patent says that the rear plate is let into and fastened to the back of this circular rack, and that the rack performs the office of pillars to connect the rear and middle plates. The circular disc cannot in any event be a rear plate, and the patent particularly specifies otherwise, designating as the plate the device in which the hub of said disc is mounted; in other words, the plate which is lettered "C" in the drawings of the patent is specified as the back plate.

Int. 14. Mr. Earle, in reply to int. 16, speaks of the plate which forms the back of the circular rack as serving as a means of securing the movement to the back of the clock. Is the function which he speaks of the function of the plate as such?

Ans. It is not, and it is not, in fact, connected to the back of the clock, the connection with the back of the clock being made by pillars or posts which project from the back plate "C."

53 Int. 15. In reply to int. 17 of his deposition Mr. Earle states that there is another plate to the rear of the sheet-iron back plate, to wit, the back of the clock, without which the mechanism contained in the remainder of the frame would be practically useless. Is there any reason why the Hotchkiss movement, detached from the back of the clock, would be practically useless which does not apply to all movements that are intended to be supported by the clock case?

Ans. There is not.

Int. 16. Please look at Defendants' Exhibit "Defendants' Clock Rearranged Pivots," and see if by reason of the supposed rearrangement embodied in said exhibit the same is taken out of any claim of the Hotchkiss patent, giving reasons.

Ans. It is not; the reasons are that the change made is not a substantial and material one. The pivots are still substantially arranged in a circle of which the center arbor is the center.

Int. 17. What do you understand to be the mechanical object to be secured by the arrangement of the pivots in circumferences of

circles, and in the same connection state why, in your opinion, the change in Exhibit "Defendants' Clock Rearranged Pivots" is not substantial?

Ans. This arrangement of the pivots is for the purpose of bringing the train into the most compact form, and the rearrangement of them in the exhibit inquired about makes no appreciable difference in that respect.

Int. 18. Mr. Earle states, referring to the sixth claim (I quote from his answer to question 4), "that there could be no possible arrangement of wheels in a train in which the pivots could not be in the circumferences of circles drawn from the center arbor as a center." As you understand the expression, "in circumferences of circles," in the sixth claim, do you agree with Mr. Earle?

Ans. In one sense of the word pivots which are on a straight line might be said to be in circumferences or circles, and so far I agree with Mr. Earle, but I do not consider that as the sense in which that term is used in the sixth claim. The circles referred to in said claim evidently refer to the pivots at both ends of the shafts or
54 arbors, and meaning one circle for the pivots at one end of the arbors and the other circle at the other ends of the arbors. Inasmuch as the arbors generally extend straight through the frame, one might say that pivots are arranged on a circle; but when the pivots at each end are considered separately the plural must be used.

Int. 19. Please look at the several models and clocks before you, placed in evidence by the defendant as representing the prior art, and say whether you find in any of them the subject-matter of any one of the first eight claims of the Hotchkiss patent.

Ans. I have examined the Exhibit "Everitt Clocks," Exhibit "German Clock, Three-Wheel Train," Exhibit "Brown Clock," Exhibit "Hubbell Movement," and Exhibit "Davies Patent," and none of them embody the invention which is referred to in either of the first eight claims of the Hotchkiss patent.

Int. 20. Please compare Exhibit "Everitt Clock" with the combination described in the patent and specified in the fifth claim, and give your reasons for your conclusion that it does not contain that combination.

Ans. The center shaft of the "Everitt clock" is one which revolves once in twelve hours, and consequently it is not the center arbor of the Hotchkiss patent, and it does not carry the center wheel and center pinion of the Hotchkiss patent. The center arbor, center wheel, and center pinion in the clocks of the Hotchkiss patent revolve once an hour and the center arbor carries the minute hand. The improvement in the fifth claim of the Hotchkiss patent relates to that part of the train which is forward of the center wheel as thus defined, and between the escape wheel and said center arbor carrying the center wheel and pinion, and its object is to make this front part of the train, starting with the wheel which revolves once an hour, with coarse teeth and large pinions and pivots, and so that they will occupy but little space. In other words, the object is to make the clock smaller without making the teeth finer than in ordi-

nary clocks. Inasmuch as the shaft, which is central in the "Everitt clock," revolves only once in twelve hours, instead of only once an hour, the fact that it has three wheels between the arbor, which is centrally arranged, and the escape wheel, does not exhibit
55 the feature of making a smaller clock with coarse teeth, and it does not contain, as I have said before, the center arbor carrying the center wheel and center pinion in the sense of that term in the Hotchkiss patent, and therefore it cannot contain the improvement recited in said fifth claim. This "Everitt clock" shows three wheels between a twelve-hour wheel and the escapement wheel, but does not show three wheels between a one-hour wheel pinion and shaft and the escapement wheel as essential to the fifth claim of the Hotchkiss patent.

(Adjourned until 10 a. m., Wednesday, Feb. 21, 1883.)

Examination resumed.

NEW HAVEN, WEDNESDAY, *February* 21, 1883—10 a. m.

Present: Counsel as before.

Int. 21. Please direct your attention to what Mr. Earle says, in reply to int. 21 of his deposition, as to this Everitt clock movement and its relation to the fifth claim of the Hotchkiss patent, and say whether you agree with him, giving reasons.

Ans. I agree with Mr. Earle in saying that in the Everitt clock there is no center pinion on what he calls the center shaft, and in substance that the wheel which he calls the center wheel in the "Everitt clock" is in fact the main wheel at the beginning of a clock train instead of a center wheel in the middle of the train that is intermediate between the driving wheel and the escapement wheel. I do not agree with him any further than this. I consider this difference a material and essential one. The fifth claim particularly specifies the center arbor as one which carries the center wheel and center pinion. The specification says as follows: "In this specification the expressions frame, escape wheel, escape-wheel arbor, center wheel, center pinion, and center arbor are used in this well-known and technical sense, viz., * * * center arbor (denotes) the arbor to which the minute hand is attached, and which is
56 centrally arranged with respect to the dial and center wheel, and center pinion denotes the wheel and pinion which are arranged on the center arbor and form parts of the train, as distinguished from a wheel and pinion on the center arbor (often found in American clocks), which form a part or parts of the dial work." The main shaft of the Everitt clock, although centrally arranged, does not come within the definition of the term center arbor as thus defined; neither does the main wheel of the train movement in the Everitt clock come within the definition of center wheel as defined in the Hotchkiss patent. The fifth claim particularly specifies the center pinion, and this Everitt clock has no pinion whatever upon its main shaft, or the shaft which is centrally arranged in said clock. This feature is important, because it distinguishes clearly that the

center shaft, carrying the center wheel and center pinion, is a shaft which is driven by other gear or gears back of the center shaft, in contradistinction to a main shaft.

Furthermore, the center shaft, as described in the Hotchkiss patent, is one in which the center wheel is arranged thereon with frictional contact, so that the pointers may be turned by turning the center shaft, without turning the center wheel, whereas in the Everitt clock the main wheel and main shaft centrally arranged are, I believe, rigidly united to each other, so that in setting a pointer it must be turned without turning the main shaft.

The center arbor of the Hotchkiss patent is also one which extends through from the front to the rear part of the train; whereas the shaft, which is centrally arranged in the Everitt clock, instead of being a shaft which extends clear through the frame, consists of two separate shafts arranged in longitudinal alignment, so that one can turn independently of the other; and for this reason, and because the wheel is rigidly connected to one of these centrally-arranged shafts, the pointer cannot be set by the application of a key to the rear end of the shaft which is centrally arranged in the Everitt clock.

In my opinion, it is not essential to the fifth claim whether the pinion and center wheel are connected by a ratchet or otherwise, but the pinion is for the purpose of connecting with
57 suitable driving gear, and even when so construed the Everitt clock is no answer. In other words, this clock is no answer even if the location of the ratchet-wheel is not considered.

Int. 22. Compare Exhibit "Brown Clock" with the invention described in the Hotchkiss patent and specified in the fifth claim.

Ans. This Exhibit "Brown Clock" is unlike the combination specified in the fifth claim of the Hotchkiss patent, because it contains no center shaft, center wheel, or center pinion within the meaning of those terms as defined in the Hotchkiss patent, and consequently it cannot, without said center shaft, center wheel, and center pinion, embody the combination recited in said fifth claim. In this Exhibit "Brown Clock" there is no escapement wheel. The train in this "Brown clock" ends with an arbor having a pinion on it which carries an arm, and, as the clock runs, this shaft and arm are continuously revolved and swing a suspended ball around in a circular path. The Hotchkiss specification says: "Escape wheel denotes the wheel the teeth of which act on the pallets, the escape-wheel arbor, the arbor to which the escape wheel is fastened." There is no such escape wheel or escape-wheel arbor in the Exhibit "Brown Clock." These differences are material because the improvement recited in the fifth claim does not, in my opinion, consist of three wheels suitably fastened on arbors carrying pinions when arranged in any and every place in a clock movement, but it relates to said wheels, arbors, and pinions when arranged in a particular part of the clock movement for the purpose of economizing space and getting a small clock with coarse teeth. There is no such arrangement in the "Brown clock," and there is nothing in the "Brown clock" which accomplishes a like result.

Int. 23. Please refer to Mr. Earle's answer to int. 19 and state whether the differences which he points out in said answer between the "Hotchkiss clock" and the "defendants' clock" are in any way material when the comparison is between that portion of the "Hotchkiss clock" enumerated in the first eight claims and the corresponding portion of the "Defendants' clock."

Ans. I have read the answer inquired about, and in my
58 opinion the differences therein specified are immaterial when considered in relation stated in the question.

Int. 24. Compare the clock described in Exhibit "Davies Patent" with the Hotchkiss clock described in the Hotchkiss patent.

Ans. The Exhibit "Davies Patent" shows a clock in which the main spring is centrally arranged upon the back of the clock movement. The movement is mounted in an ordinary frame consisting of two plates marked "B B" in the drawings of said patent. One wheel and one pinion, but not the center pinion, are arranged upon the back of the rear plate. The center shaft extends through to the back of the clock, and the pointers may be set by turning this shaft from the back of the clock. These constitute all the features of resemblance excepting those which are common to ordinary clocks. The clock of the "Davies patent" is wholly unlike any of the combinations specified in the claims of the Hotchkiss patent. It does not show a clock having a three-plate frame, but the entire movement, as before stated, is supported in an ordinary frame having only a front and rear plate, and without any middle or division plate at all. The center wheel and center pinion are both between the front plate of the frame and the one immediately at the rear of it, which I have already said is the rear plate.

Int. 25. Compare Defendants' Exhibit "Hotchkiss' Center Shaft" with Defendants' Exhibit "Defendants' Center Shaft" and say whether there is any material difference between them when they are compared with reference to the several inventions specified in the first eight claims of the Hotchkiss patent, giving reasons.

Ans. There is not. The only difference worth noticing is the difference in the manner of connecting the center wheel and center pinion. In the Exhibit "Defendants' Center Shaft" the center wheel and center pinion are rigidly connected together, or, in other words, they are connected by means of a permanent fastening. In the Exhibit "Hotchkiss' Center Shaft" the center wheel and center pinion are connected by means of a ratchet and pawl, so that in winding the clock the center pinion may turn backward. This
59 I consider immaterial, because none of the first eight claims of the Hotchkiss patent make any reference whatever to the manner of or means for winding the clock; on the contrary, they relate wholly to the running of the clock and to the means employed of transmitting the power of the spring for propelling the clock. When considered in this light, the Exhibits "Hotchkiss' Center Shaft" and the "Defendants' Center Shaft" are the same. In this Exhibit "Hotchkiss' Center Shaft," when power is applied to the pinion in the direction to drive the clock, the ratchet acts to con-

nect the pinion and center wheel, the same as if they were rigidly united in one piece.

Int. 26. Is there any exhibit put in evidence by the defendants which illustrates the value of the subject-matter of the fifth claim of the Hotchkiss patent as a combination adapted to produce a clock movement of a very small size which shall have the coarse wheel teeth and large pinions which characterize a clock?

Ans. The Exhibit "Hubbell Movement" is a clock which shows the ordinary construction of clocks with two wheels between the center arbor carrying center wheel and center pinion and the escape arbor carrying the escape wheel and pinion. By a comparison of this clock with the "Hotchkiss Clock" or the "Defendants' Clock" it will be seen that this part of the train occupies considerably greater space in the "Hubbell Movement" than it does in the "Defendants' Clock" or the "Hotchkiss Clock," while, at the same time, the teeth in the "Hubbell Clock," which is the largest clock, are finer than the teeth in the other two smaller clocks, and this Exhibit "Hubbell Movement" is a good illustration of an objectionable feature in clocks for a small case which the combination in the fifth claim of the Hotchkiss patent has remedied.

Int. 27. How long a time would it take a clock manufacturer, having all the general facilities for clock making, to produce all the tools and machinery requisite to manufacture the "Lane clock," and special to that clock, if he had before him for that purpose simply the letters patent, and without any aid from tools employed in making a former clock of the same size and proportions?

Ans. Judging from my observations and experience in clock making, and especially in the production of new clocks, I should say that to so far perfect the tools as to get the clocks ready for market it would ordinarily take about two years.

Int. 28. Mr. Lane in his testimony states that the Hotchkiss clock sometimes disconnected the planet wheel and the center pinion as they were made by the Yale Clock Company. Assuming that such was the case in the clock as constructed by them, state to what the defect was due and whether it related to construction or to its organization as a clock.

Ans. It related to the construction and not necessarily to the organization of the clock. It could be very easily remedied by only slight changes of construction—that is, making the planet wheel and pinion engage each other a little farther from the end of the pinion. This could be done by letting the pinion into the disc or making the disc cup shaped, so as to bring the planet wheel farther on the pinion, or by connecting the planet wheel to the disc by means of a longer post or stud.

Cross-examination by CHARLES R. INGERSOLL, Esq., of counsel for defendants:

Cr. Int. 29. In your testimony you have referred to "ordinary clock movements;" describe the movement that you intend to so designate, naming its several parts.

Ans. I did not intend by that term to refer to any one particular movement, but I had reference to several kinds of clock movements, one form of which may be said to consist of two plates, a main shaft with a spring or weight thereon, and a train of wheels and pinions mounted upon shafts to impart power to an escapement wheel, which is connected with a verge having pallets and vibrates the pendulum, the train being provided at a convenient point with a shaft, centrally arranged with reference to the dial, carrying a wheel and pinion and a minute hand, which parts are commonly termed the center shaft, wheel, and pinion, and the pointer the minute hand. The center wheel is generally arranged upon the center arbor with frictional contact, so that the pointer and center shaft may be turned
61 without turning the center wheel. Such, in brief, constitutes an ordinary clock movement, varying, however, in detail when made by different manufacturers, or for different purposes by one manufacturer.

Cr. Int. 30. Am I to understand by your answer that an ordinary clock movement, as you understand it, contains a train, the parts of which are, 1st, a main wheel; 2d, a center shaft carrying a center wheel and center pinion; 3d, a train of wheels transmitting the power from the center wheel to the crown or escape wheel, the whole movement being framed in plates? My question has reference only to the ordinary thirty-hour clock.

Ans. You are substantially correct.

Cr. Int. 31. Does not the Defendants' Exhibit "Hubbell Movement" show such a movement as you say belongs to an ordinary thirty-hour clock movement, except as that exhibit may have parts to adapt it for an eight-day clock?

Ans. Yes, with the further exception that this is marine movement instead of a pendulum movement.

Cr. Int. 32. Referring, now, to the complainants' Hotchkiss reissued patent, what parts of the clock movement described in that patent do you understand the patentee to comprise in the term "train" when that term is used by him? Name the parts specifically.

Ans. He evidently includes under the word "train," the center wheel, escape wheel, and pinion on its arbor, the three wheels with pinions on their arbors which are in front of the center wheel, and the center pinion and circular rack connected by the planet wheel.

Cr. Int. 33. He comprises, does he not, in his train all the parts which transmit the power from the spring to the crown wheel?

Ans. Yes.

Cr. Int. 34. Do you find any such train composed of such parts in defendants' clock?

Ans. No.

Cr. Int. 35. Do you find anything in the first eight claims of the Hotchkiss reissued patent which relates specially to that class of time-keeper in which a fixed annular rack or internally-toothed
62 wheel is employed to aid the spring barrel in rotating the train of wheels? If you do, state what it is, and in which of those claims you find it.

Ans. No, not necessarily.

Cr. Int. 36. When, for example, in the first claim of the reissued patent "a train which is divided into two parts, a front part and a back part," is claimed as the invention of the patentee, do you understand him to limit the claim to the kind of train set forth in the specification—that is, a train containing a fixed annular rack and its connections?

Ans. The claims do not contain anything which specially relates to the annular rack and its connections and only refer to the same in a general way instead of specially. They do, however, as, for instance, the first claim made special reference to a train, and as only one kind of train is described in the patent, I understand that the claims refer to that particular train, or its equivalent.

Cr. Int. 37. Do you give any significance to the concluding words of the claims, as, for instance, in the first claim the words "as set forth," and, if so, what is that significance?

Ans. Yes. I considered those words, although I suppose every claim cannot properly be read only in the light of the preceding specification, but these words, to my mind, clearly imply that the claims were intended to cover nothing but the parts mentioned therein, as described in the specifications or their equivalents.

Cr. Int. 38. What do you mean by the expression "their equivalents;" equivalents for what purpose?

Ans. I mean the equivalents of the parts which are mentioned in the claims, and as for the purpose they must be equivalents for the purposes referred to in the claim, if any there be, and the purpose for which those parts are employed, as described in the specification. For instance, a train is mentioned in the first claim; that train appears from the specification to be the mechanism which is employed for the purpose of imparting the power of the spring to the escapement wheel. As I have before stated, I consider the ordinary main wheel as the equivalent of the circular rack and planet wheel for communicating the power of the spring to the center pinion, and therefore a train which employs such main wheel in place of the
63 circular rack and its connections I consider the equivalent of the train mentioned in the first claim. I understand also from Mr. Earle's testimony, in answer to his int. 5 as found on page 61 of the printed record, that "this arrangement of stationary gear, revolving disc, and wheel, commonly called planet wheel, was a well-known device long prior to the Hotchkiss invention." This being the case, I consider that a train which substitutes one well-known device for another well-known device in parts of the Hotchkiss train produces substantially the same train, although it may not be literally the same, and if it is not the same train it is clearly an equivalent of the Hotchkiss train for the ordinary purposes of a clock train.

Cr. Int. 39. Then I understand you to mean by the use of the word "equivalent" in this connection—that is, as explaining the scope of the first claim—all devices forming a part of a clock train that have the same functions in operating that train, without regard to the shape, size, or construction of those devices; am I right?

Ans. Substantially so; but I had limited my explanation of the

same to known devices, and I would make the further provision that these devices must be such that they can be substituted for the parts which are omitted in the combination named in each claim, and that when so substituted the combination as a whole will perform substantially the same functions as before for the purposes of each combination, as described in the patent.

Cr. Int. 40. Do you mean to be understood that in your opinion the first claim in the reissued patent is intended to comprise all clock trains and movements, irrespective of the number, shape, size, or mode of operation of the parts comprising the train, if only those parts are arranged as stated in said claim? If you do not mean to be so understood, state particularly the qualification that you put to the statement of opinion contained in my question.

Ans. I did not mean to be understood quite so broadly as that; still I am not prepared to say that the claim may not be so construed. I consider the clock of the Hotchkiss patent as one having for its special object an efficient movement, compactly ar-
64 ranged, and in my mind a part of that compactness is brought about by the arrangement of the wheels in the front part of the train; in other words, that the front part of the train is new, and, therefore, it would be very proper to consider the train named in the claim as one in which this novelty gave it some special importance. I understand from Mr. Earle's testimony, as previously quoted by me, that the rear part of the Hotchkiss train is old, and consequently it seems to me that this old part of the train cannot have any special significance in the claim, and that the said part of the train might have substituted for it, as an equivalent, any other device for the rear part of a train which can be employed in the combination named in the first claim and produce substantially the same results as the complete organization named in said claim.

Cr. Int. 41. Please withdraw your attention from Mr. Earle for a moment and direct it to the Hotchkiss reissued patent, the meaning of the first claim of which I am now seeking. Do you find anything in that patent to indicate that the patentee regards the rear part of his train as old?

Ans. No; nothing further than that the only claim which relates specifically to the circular disc is the ninth claim, which appears to be quite limited, and the fact that the circular rack and its appendages are not made the subject-matter of any other claim.

Cr. Int. 42. You don't find it disclaimed, do you?

Ans. I do not, other than by failing to claim it.

Cr. Int. 43. Do you, then, wish to be understood that when the first claim of the reissued patent speaks of a train which is divided into two parts the patentee meant only the part of that train described in the specification which you call the fore part?

Ans. No; it must mean the whole train; otherwise there could be no division.

Cr. Int. 44. Then is there anything in the claim, or in any other part of the patent, which indicates that the character of the train mentioned in the first claim was given to it by the fore part of the train any more than the back part?

Ans. I do not think any such difference is set out in the claim; the specification, however, in describing the train dwells much
65 more specifically and fully upon the front part of it than it does upon the back part, but I do not know as it does so for the purposes of the combination named in the first claim.

Cr. Int. 45. Now please consider carefully my 40th question, and state whether you are not prepared to say that, in your opinion, this first claim is intended to comprise all clock trains or movements which are divided or arranged as stated in that claim, without regard to the shape, or size, or number, or mode of operation of the parts composing that train, only assuming that the parts are there to perform the ordinary functions of a clock train. If you are not prepared to give that as your opinion, please state in what manner the parts of the train which is the subject of that claim are to be limited.

Ans. No; I am not prepared to make quite so broad a statement as that, because the claim refers specifically to certain parts of the train, viz: the center wheel and center pinion, also the center arbor carrying the minute hand. These parts are specifically described and all defined in the specification by language which I have before quoted, and it is clear to my mind that the train should have a center wheel, center pinion, and center arbor, as defined in this patent. The other parts of the train, aside from the escape wheel and escape-wheel arbor, are not thus definitely defined. Now, as to size and shape, the special object of the combination named in the first claim is to make an efficient clock compactly arranged. The patentee having disclosed new means for a mode of accomplishing this object, I suppose that any one would be within his claim if they employed the same method and means for making a larger clock, but in that event they would not reap all the benefits or rather the best results of the combination referred to in the first claim. The shape of the train must be such as will admit of its being divided in the manner and by the means referred to in the claim.

Cr. Int. 46. My question assumed that the train referred to in this claim was arranged as there stated, which implies that there existed the center wheel and center pinion and the means of arrangement. Now, leaving out of view those parts, can you not state by an affirmative or negative answer whether the train which is
66 the subject of that claim is not intended to comprise all trains arranged in that way, irrespective of the number, or shape, or method of operation of the several parts composing it?

Ans. The only reason why I cannot answer in the affirmative is the fact that the conditions imposed by the claim, and which are assumed to be admitted by the question, it appears to me in a great measure govern the size and shape and mode of operation of the train. I am free to say, however, that the first claim was not intended to impose any limitations, except those which are named in the claim, and that it substantially covers all trains which fulfill its conditions.

Cr. Int. 47. I understand you to say that what the patentee means by a "divided train," or a "division of the train," is an arrangement

of the parts of the train on either side of a certain point of division, without any division of those parts in the sense of their disconnection; am I right?

Ans. Not exactly. The patent defines divided in the sense it is therein employed as arranging parts of trains "between different plates." All of the claims which refer to the division of the train refer either to the three plates or else to the middle or division plate. You are right in understanding me as saying that this division of the train is not a disconnection of the train. The division of the train referred to in the patent I understand to be the division of a connected train.

Cr. Int. 48. And such division is affected by arranging the different parts on either side of a certain designated point, and in no other way. Is not that your understanding?

Ans. No; it must be affected by the employment of a division plate upon the two sides of which the two parts of the train are arranged.

Cr. Int. 49. You say that the division of the train referred to in the patent you understand to be the division of a connected train What do you understand by a division of a disconnected train? Give an example.

Ans. The best example I can give of the parts of a disconnected train would be to take a clock train apart and divide the parts into two different piles. I know nothing of any disconnected clock train, unless it is a clock train which has been taken apart.

67 Cr. Int. 50. Do you then regard the division of an operative train by disconnection of its parts as an absurdity?

Ans. It would cease to be an operative train if disconnected.

Cr. Int. 51. In your answer to interrogatory 25 this morning you say, "In the Exhibit 'Hotchkiss' center shaft,' when power is applied to the pinion in a direction to drive the clock, the ratchet acts to connect the pinion and center wheel the same as if they were rigidly united in one piece." Before the power is applied as there supposed, was there any such connection between the pinion and center wheel as resulted from the application of the power?

Ans. The parts were connected the same before the power was applied, the ratchet being constantly in position to perform its work; but before the application of the power the pawl might or might not have been in actual engagement with the driving shoulder of the ratchet, and it is necessary to have the power first take up the slack between the ratchet wheel and pawl before they are rigidly connected to drive the center wheel. Prior to taking up this slack the center wheel and center pinion were loosely connected within certain limits in contradistinction to being rigidly connected, and they are loosely connected for the purpose of allowing the center pinion to turn backward during the winding operation.

Cr. Int. 52. In the same sense in which you use the word "connection" to indicate the relation of the pinion and center wheel after the power was applied those parts might be said to be disconnected, might they not, when the power was applied to wind the clock?

Ans. During the small fractional part of a day in which it takes to wind the clock the parts might be said to be disconnected, but it would not be, strictly speaking, correct, because the parts do not in any way change their relation to each other, but the pawl and ratchet are always connected ready for action whenever the pinion is propelled in either direction.

Cr. Int. 52*a*. Returning now to the definition of a divided train, which you understand the patentee to give, in your opinion does he mean by such division of a train as he defines anything more
68 than an arrangement of the parts of a train in a certain manner pointed out by him, and that irrespective of the character of those parts, except, of course, that they shall be parts performing appropriate functions in a clock movement? If you think he means anything more than that state definitely what it is.

Ans. Yes; he means more than that; he means the train divided in his particular way and by his particular means, as specified in his claims. I do not suppose that the claims were intended to be any further limited.

Cr. Int. 53. Please now state what useful purpose you understand to be served by such a division of a clock train?

Ans. He is enabled to produce an efficient and very compact clock by arranging the smaller wheels of the train upon short arbors and around a center arbor, while the other parts of the train which drive the center arbor through its pinion are arranged in the rear part of the train, and yet the whole thickness of the train, including both parts, is not materially greater than that of an ordinary clock train. He connects these two parts of the train by means of the center arbor which extends into both parts thereof, and is accessible from the rear of the clock for setting the pointers, notwithstanding the fact that the train is divided into two parts. By making the center shaft carrying the center wheel and center pinion the shaft which extends through both divisions of the train and having the two parts of the train mesh into said center pinion and center wheel the parts are much more compactly arranged than they are in prior clocks having divided trains connected by other means than the center arbor with its wheel and pinion.

Cr. Int. 54. Now you have described the mechanism of the Hotchkiss clock as you think it is affected by such a division of a train as is claimed in the first claim of the reissued patent, but you have already admitted that that claim of the reissued patent is not confined to the particular mechanism of the Hotchkiss patent, but on the contrary the claimed division of a train is applicable to all trains, no matter what the character of the parts, if they had a center shaft and center pinion and wheel. Now, what I wish to know is, what useful purpose is accomplished by such a division of a train without reference to the particular character of the parts composing it?

69 Ans. I have not made the admission named in the question, but the statement of my admission would have been substantially correct had it included the equivalents for the Hotchkiss

train. The advantages named in my last answer apply equally well to all clock trains to which the division of the train as set forth in the claims of the Hotchkiss patent is applicable, and I therefore refer to that answer as my answer to the present question.

Cr. Int. 55. You do not mean, I suppose—but if you do mean it say so—that by taking the parts of a clock train, no matter what the number is, or their size, or the character as to fineness of their teeth, and no matter by what devices certain functions ordinarily performed by parts of a clock movement are performed, that by simply arranging those parts into two different apartments at a point between the center wheel and center pinion you can produce a movement which shall have coarse teeth, large pinions and pivots, and will make necessarily a more compact clock than is made in other ways?

Ans. No; not literally.

Cr. Int. 56. Do you mean anything more than that if one has prepared certain parts of a clock train or movement suitable for the purpose that he will be enabled to arrange those certain parts usefully or advantageously by making a division of them into two compartments at a certain point which lies between the center pinion and center wheel?

Ans. Yes; I mean more than that. I mean that by arranging his wheels and train so as to be thus divided he can secure greater advantages and arrange his movement more compactly than he could in case he did not arrange his train so as to adapt it to said division.

Cr. Int. 57. But he would have to have his wheels and train and know their character and the function they could perform before he could utilize this idea of arranging them into the two compartments, would he not?

Ans. Yes; before he could do so to the best advantage.

Cr. Int. 58. Does not then the whole utility of this division of a train, as this patentee defines such division, depend entirely upon the character of the train which is to be divided?

Ans. No; it results from dividing the train in the particular manner described in the Hotchkiss patent, and, as I have maintained all the while, in order to reap the full benefits of this division it must be a train to which the division named in the claims is adapted.

Cr. Int. 59. Now, does the Hotchkiss patent show any other train to which such division is adapted than that train which is specifically described in the patent, and the rear part of which is made up of the peculiar internal gear and its connections, of which he claims the invention?

Ans. It does not; as I have before stated the patent shows and describes only one train.

(Adjourned until Thursday, Feb. 22, 1883, 10 o'clock.)

Examination resumed.

NEW HAVEN, THURSDAY, *Feb.* 22, 1883—10 o'clock a. m.

Present: Counsel as before.

Cr. Int. 60. Do you find anything in the Hotchkiss train mechanism—I mean anything special and peculiar to it—which requires a division of such train in the sense of separating the forward part of the train from the back part and confining it between the front and middle plates?

Ans. The Hotchkiss train, as shown in the patent, cannot in any way that occurs to me now be arranged in its most compact form without dividing it substantially in the manner shown and described in the patent, and in this sense it may be said to require the division of the train by means of plates; but, if the compactness of form is not taken into consideration, the same train, consisting of the circular rack and the other wheels shown in the patent, might be arranged without dividing them in the manner stated in the patent.

Cr. Int. 61. Am I then to understand you as meaning that, leaving out of view the question of compactness of form, there is nothing in the train requiring such division as I have indicated?

71 Ans. I understand that it is not necessarily so.

Cr. Int. 62. I infer that you agree with Mr. Earle that the arrangement of stationary gear, revolving disc, and planet wheel was a well-known device prior to the Hotchkiss invention; is that so?

Ans. I do not of my own knowledge know such to be the fact, but I have no reason whatever to doubt the truth of that statement.

Cr. Int. 63. Have you read the original Hotchkiss patent?

Ans. I believe I read it in a hasty way some time ago.

Cr. Int. 64. Do you mean to be understood that you have given your testimony with respect to the reissued patent without acquainting yourself with the contents of the original patent?

Ans. Not exactly; I mean that when I was first called into this case I examined the drawings of the original patent and read the specification once through rather hastily, and that I have not paid any attention to it since.

Cr. Int. 65. In the specification of Hotchkiss' original patent the patentee commences with this statement: "This invention relates to that class of time-keepers in which a fixed annular rack or internally-toothed wheel is employed to aid a spring barrel in rotating the train of wheels." Does not that statement imply and advise you that the fixed rack was then a well-known instrument in clock movements for rotating the train of wheels?

Ans. I so understand it.

Cr. Int. 66. The specification then proceeds as follows: "The nature of said invention consists partly in the combination of a fixed internally-toothed circular rack and a concentric going barrel or plate with a main spring, a transmitting wheel rotating with said barrel, and a fixed clock movement." What do you understand to be meant by the term "clock movement," as there used?

Ans. The term "clock movement," as used in the quotation, I think is capable of two meanings, viz: to comprise the whole clock, in-

cluding all the parts named in the paragraph quoted, and, second, it may mean all that part of a clock movement except those
72 parts which are named in the paragraph quoted; probably the latter meaning is the one intended in the patent.

Cr. Int. 67. In point of fact the only movement the parts of which are not specifically mentioned in the quotation is the train of wheels forward of the center pinion; is not that so?

Ans. No, it is not; the center pinion must be included and then you would be correct. Since my last answer I find that the original patent defines the word movement as "the remaining wheels of the train."

Cr. Int. 68. Have you any doubt that in the part to which I have called your attention the patentee, in stating his combination of the internally-toothed rack and its appendages with a fixed clock movement intended by the term "fixed clock movement" that portion of the train other than the rack and its appendages?

Ans. I have not.

Cr. Int. 69. Looking further into the specification of the original patent, please state if you do not find it there admitted that movements have heretofore been carried by going barrels operated by a fixed rack?

Ans. I do.

Cr. Int. 70. But do you not also find in connection therewith that such movements had been in their operation so combined with the circular rack and its appendages that they were carried around by the revolving plates rotating with the plate?

Ans. The patent says so.

Cr. Int. 71. Does it not also state in effect, and so as to advise any one reading it, that one object of the patentee's invention was to do away with this rotation of the movement, and that he accomplished it by fixing the movement in a stationary position between the front and middle plate, and therefore claimed as his invention the combination of the well-known device of the circular rack and its appendages with such a fixed clock movement?

Ans. I understand it that one object of the patentee's invention was to do away with the rotation of the movement. I understand that he accomplished that object not merely by fixing the movement, but by employing with a fixed movement and the cir-
73 cular rack a rotary plate carrying the planet wheel which connects the rack and movement; and such is, in substance, the first claim of the original patent. I do not understand that he claimed the combination of the fixed rack and its appendages as they had formerly existed and a clock movement, but he claimed that combination of the fixed rack and its new appendages, viz., the rotary disc and planet wheel to connect the rack and the center pinion mounted in a stationary frame.

Cr. Int. 72. What does he mean in the sentence previously quoted by me, as a statement of his invention, by the term "a concentric going barrel or plate?"

Ans. He evidently refers to what I have designated as the revolving disc.

Cr. Int. 73. Now, when afterwards he refers to movements that have been heretofore carried by "going barrels operated with a fixed rack," what does he mean by going barrels?

Ans. The expression is very indefinite, but taken in its connection I have no doubt but what he refers to revolving plates in which a large share of the clock movement was mounted.

Cr. Int. 74. Now, whether Mr. Hotchkiss was the inventor or not of all the parts forming the rear part of that train—I mean all the parts to the rear of what you say he calls the clock movement—do you not understand that his object in providing for the operation of the whole mechanism, and so as to remove the disadvantages attending the prior constructions of movements in which the train of wheels rotated with the going barrel or plate, was to separate the clock movement proper or train of wheels from the other mechanism by confining that movement between the front and middle plate by a fixed arrangement which made the movement stationary?

Ans. Yes; that was one object.

Cr. Int. 75. Do you not, therefore, now find in the Hotchkiss train mechanism something else than that which relates only to compactness of form which requires a division of the train in the sense of separating the forward part of the train from the back part of the train?

Ans. No; not if any particular stress is to be laid upon the words forward and backward in the sense of being forward and back-
74 ward of a given plane, which was the sense that I have considered it in most of my former answers. It is, however, as I have always supposed, necessary to the exact Hotchkiss train that the part of the train between and including the center shaft, its wheel and pinion, and the escapement shall be stationary. The requirements of this special train make it necessary that the planet wheel and its axis revolve about the center wheel while the rest of the train is fixed. If this is the division meant in the question, I should consider it a requirement of the Hotchkiss train. If, however, the rotary disc of the Hotchkiss train should be made stationary and the circular rack made to rotate by the power of the spring instead of the disc I think it would still be the Hotchkiss train, and in that event the division called for in the question would not exist.

Cr. Int. 76. I will alter my question with a view to obtaining an affirmative or a negative answer to it. In your answer to cr. int. 60 you have said that if compactness of form is not taken into consideration the same train, consisting of the circular rack and the other wheels shown in the patent, might be arranged without dividing them in the manner stated in the patent. Since that answer it has appeared, as I have understood you to admit, that patentee in his original patent states as an object of his invention that the train of wheels or clock movement proper, consisting of the wheels between the center wheel and crown wheel, inclusive, shall be arranged between the front and middle plate, so as to make them stationary and not to be affected in that respect by the rotation of the going barrel or plate and its connections. Now, then, I desire to know whether

you do not now find in the mechanism of the Hotchkiss train as that train is defiined in the reissued patent something else than that which relates only to compactness of form, which requires a division of the train in the sense of separating and aparting the wheels from the center wheel to the crown wheel, inclusive, from the other part of the train by means of the front and middle plates, between which they are arranged?

Ans. I have not made the admission stated in the question. If the statement of my admission should be changed by striking out the words "shall be" and substituting therefor the word
75 "are" the statement of my admission would be correct. So far as making the train stationary with respect to its position the words "shall be" would be correct. Now, in answer to the question proper, upon mature reflection, I am prepared to say positively that there is nothing peculiar to the Hotchkiss train that positively requires that it should be divided into two compartments in such a sense that if it were not so divided that it would not be substantially the same train. The same train consisting of all the parts can be arranged between two plates and still be the Hotchkiss train, but it would not be in as practical a form as that shown in the patent. In this answer I have confined myself to the Hotchkiss train and not to the invention relating to the arrangement of the train described in the patent. To prevent being misunderstood, I will repeat that I only wish to say that the train, including the circular rack and all the gearing of the Hotchkiss clock, may be set up and run without dividing the train in the sense of that term as used in the patent, or without necessarily making the planet wheel revolve about the center wheel. It is clearly the intention of the original patent that the train should be divided.

Cr. Int. 77. You apparently misunderstand my question; I do not ask you whether you can alter the Hotchkiss train, nor do I use the word divide in the sense of the patent, for about that we don't agree, but my question relates to the object of the patentee's invention as disclosed by his specifications, to which your attention has been called, and I wish to know whether you do not understand that the patentee constructed the mechanism of his clock, as it is shown in both the original and reissued patents, with his train of wheels comprising the wheels between center wheel and crown wheel, inclusive, arranged between the front and middle plates, and in that position made stationary for the purpose of obviating the disadvantages which attended the prior construction of movements in which a circular rack and revolving going barrel or plate were employed, and which in those prior constructions required the wheel train to rotate with the going barrel or plate?

Ans. Yes; the patentee so constructed his mechanism, and the object named in the question is one of the objects of that construction.

76 Cr. Int. 78. Now comparing the patentee's construction with the constructions which existed before, and which it was his object to improve, and using the word divide in the sense of separating and aparting the stationary train of wheels by means of

plates from the other part of the going mechanism (whether that sense of the word divide is the sense of the patent or not), will you now say that in the patentee's actual construction, as shown in his patent, that there is not an object in dividing the whole going mechanism into two parts by means of plates, and by which the train of wheels from the center wheel to the crown wheel, inclusive, shall be between the front and middle plates, which object relates to something else than compactness of form?

Ans. Certainly there is, and I never thought otherwise.

Cr. Int. 79. And that object is to so arrange the train that the circular rack and going barrel or plate may be used with a stationary and fixed movement instead of a transitory movement; is it not so?

Ans. Yes; that is one object.

Cr. Int. 80. Now do you find in the defendants' clock any such division of the train as I have just defined, and in this question I do not assume that such division is the division referred to in the patent?

Ans. Without taking time to find out the meaning of the word division as used in the question, I will state that I do not find in the defendants' clock any circular rack or any revolving disc bearing a planet wheel, and consequently I do not find in said clock a division of such a rack, disc, and planet wheel from the other parts of the train.

Cr. Int. 81. Do you not understand by the specification of the reissued Hotchkiss patent that frames of movements composed of three plates for the arrangement of the movements within those plates were well known before the Hotchkiss invention?

Ans. I do.

Cr. Int. 82. Do you not also understand by that specification that the trains of clock movements have been divided, in the sense in which the patentee uses that word, between different plates, before the Hotchkiss invention?

Ans. I do.

77 Cr. Int. 83. Does the novelty of the division which the patentee makes in his train consist in such division being made at a certain and definite point in the train—that is, between the center wheel and center pinion? If there is any other novelty in the division he claims state it.

Ans. Considering the different features of his invention abstractly or by themselves such division at that point may be said to be the only point of novelty shown in his division of the train, but I do not think the question gives a correct statement of the novelty of the divided train of the Hotchkiss patent. I think that the means for dividing the train, the means for connecting the two parts of the train when so divided, and the particular point or part of the train where this division is made should all be considered together in order to clearly set forth the novelty of the Hotchkiss divided train. So far as I know no trains which were divided into parts by arranging the parts between different plates have ever been connected together by means of the center arbor extending into both divisions of the train, said arbor having thereon a pinion within one division

of the train and a center wheel within the other division of the train.

Cr. Int. 84. You don't mean to be understood, do you, that there was any novelty in arranging the parts of the Hotchkiss train between different plates because of their connection by means of a center arbor extending into both divisions?

Ans. I do not wish to be understood as saying anything different from what I have said, and I have not made any statement to the effect of the one mentioned in the question. The mere extension of a center shaft or arbor without connecting two separate divisions of a train I do not wish to be understood as giving any novelty to the Hotchkiss invention. The Hotchkiss patent does not show any such extension of the center arbor into two divisions of a train.

Cr. Int. 85. Explain more clearly what you mean by the last sentence of your answer.

Ans. I mean that the Hotchkiss patent does not show a center arbor extended into both divisions of the train, which arbor does not also connect the two parts of the train, and therefore he does not show the mere extension of the center arbor into two parts of a train.

78 Cr. Int. 86. The means for dividing the train to which you refer in your answer to the cr. int. 83 were the same as those referred to by the patentee in his statement respecting the prior divisions of trains, were they not—that is to say, plates in frames?

Ans. Yes.

Cr. Int. 87. And the means for connecting the two parts of the train, to which you refer in the same answer, were old, were they not?

Ans. Yes—for other purposes; but they were not old for the purpose named in the question when considered in connection with a divided train.

Cr. Int. 88. Do you mean to be understood that different parts of a train were not connected by a center shaft before the Hotchkiss invention?

Ans. Yes—that is to say, different parts of a divided train were not connected by means of a center shaft, so far as I know, prior to the Hotchkiss invention. It is true, however, that the center shaft had, before the Hotchkiss invention, been employed for the purpose of attaching or connecting upon one arbor a center wheel and center pinion, and if this is the connection of parts of trains inquired about in the question a center arbor has been used for such purpose prior to the date of the Hotchkiss patent, and said center arbor, wheel, and pinion have been arranged in a clock train before the date of the patent.

Cr. Int. 89. Now, with the admissions which I understand you to make, that prior to the Hotchkiss patent a center wheel and center pinion had been connected by a center shaft forming a part of the clock train and that the parts of the same train had been divided in the sense of being arranged between these different plates forming the frame of the movement, are you not prepared to say that the

only novelty that can be found in the division of the train claimed by the patentee is that such division by the middle plate is made at a definite point between the center wheel and center pinion?

Ans. No; I am not, because, as I have said before, in substance, so far as I know, two separate divisions of a clock train were never connected together by means of the center arbor prior to the date of the Hotchkiss patent.

79 Cr. Int. 90. In your answer to cr. int. 83 you make the statement that, so far as you know, no divided trains have been "connected together by means of the center arbor extending into both divisions of the train, said arbor having thereon a pinion within one division of the train and a center wheel within the other division of the train." Do you now mean to be understood as withdrawing from that answer the limitation which is made by the last part of the answer I have quoted, beginning with the words "Said harbor having thereon?"

Ans. No; I do not wish to withdraw anything from the answer; it is perfectly correct as it now stands. If, however, the answer should be divided in the manner named in the question, it would convey a wrong impression of my meaning. It was not necessary, however, for me to put on the limitation which I did in order to make the answer correct, although the limitation is a proper one. For instance, had I left off all of that part of the answer after the words "by means of the center arbor" the answer would have been true. But the extension of the arbor into two divisions of the train should be considered with the rest of the answer or else omitted entirely.

Cr. Int. 91. Assuming that the novelty of the invention with respect to the division of the train is as you stated—that is, that the train is divided into parts by arranging the parts between different plates and connecting them together by means of the center arbor extending into both divisions of the train, said arbor having thereon a pinion within one division of the train and the center wheel within the other division of the train—would such an arrangement of any given frame affect at all the functions of the train as a time-keeping mechanism or the clock as a time-keeper?

Ans. So far as the actual running of the train is concerned such division does not directly affect the train. Indirectly it may affect the running of the train by providing for a more convenient construction thereof, so that the train would be more efficient. But these indirect results are not absolutely necessary to the division of the train, and another train which is not divided may be made to be an equally good time-keeper.

80 Cr. Int. 92. Still assuming that the invention of Hotchkiss in this respect was as stated in my last question, will you say that such an arrangement or division of the parts of a clock train would operate for the same useful purpose in all trains of clock movements in which such arrangement or division should be made, irrespective of the character of the movement?

Ans. No. I have already said that, in order to get the full advantages of the divided train of the Hotchkiss patent, his improvement should be embodied in a train which is adapted to be divided in the manner specified in his patent; even then a train might be employed in which the division could be made and the result would secure in part the advantages of the division of the train, as in the Hotchkiss patent, and at the same time not secure all of the advantages of his division; or, in other words, the better a train is adapted to be divided as described in the patent the better the results will be.

Cr. Int. 93. What sort of a train is, in your opinion, adapted to be divided in the manner specified in the patent?

Ans. Clearly a train shown in the Hotchkiss patent is so adapted, and clearly the train shown in Exhibit "Defendants' Clock" is so adapted; and further, in my opinion, most of the clock trains which are in ordinary use, as the common eight-day and thirty-hour clocks, are adapted to be so divided.

Cr. Int. 94. Do you mean that in the case of the ordinary eight-day and thirty-hour clocks such a division of the train as you have in mind would result in the same advantages which you have claimed result from such division in the Hotchkiss clock?.

Ans. Yes.

Cr. Int. 95. That is, in a general way the result would be a small clock; is that so?

Ans. Yes; or, in other words, dividing these trains would enable one to secure said result.

Cr. Int. 96. You mean, I suppose, if he was provided with the proper parts, don't you?

Ans. Either provided with them or made them. I supposed, of course, the clocks to be carried to completion.

Cr. Int. 97. The advantageous results of the division, therefore, would depend upon the character, size, number, shape, and method of operation of the parts which were provided, would it not?

81

Ans. Of course the parts must be adapted to secure the desired result. Dividing the train as in the Hotchkiss patent will enable a mechanic, if he so desires, to secure the advantages of that division, and if he did not desire to do so he might divide the train in such a way or employ such parts as not to secure all the advantages which can be secured from said division.

Cr. Int. 97*a*. What was the object in that construction of clock movements to which the Hotchkiss invention, as the patentee says in the original patent, relates? I mean those "time-keepers in which a fixed annual rack or internally-toothed wheel is employed to aid a spring barrel in rotating a train of wheels."

Ans. Not having ever seen such a clock movement that I remember of, and not having read any patent which described one, I do not feel competent to answer the question.

Cr. Int. 98. Is not the Hotchkiss clock one of that class of time-keepers to which I have referred?

Ans. Not as I understand the question. I understood the question to inquire about the clock which preceded the Hotchkiss patent and to exclude the Hotchkiss clock.

Cr. Int. 99. I repeat my cr. int. 97*a*, and invite your careful attention to it, and recall to you your testimony in this case as to your experience as a clock-maker and your experience in preparing a large number of patents for clock improvements, and your experience as an expert in various causes relating to clocks, and the frequency with which you have examined various treatises on clocks.

Ans. The quotation in cr. int. 97*a* relates to time-keepers which existed prior to the date of the Hotchkiss patent, and while the improvement described in said patent may, in a certain sense, be said to belong to the same class, it, being an improvement, must necessarily have an object different from the clock which preceded it. Although I am generally familiar with clocks, my special attention has never been called to any clock having a circular
82 rack until I was called upon to examine the Hotchkiss patent, and this is the only patent before me and the only clock before me showing such circular rack; for that reason whatever I say about them can only be in a general way. As to their object, I presume that it was to arrange a spring concentric with the movement upon the back side thereof. I suppose also, in common with other clocks, they were intended for use as time-keepers.

Cr. Int. 100. We will assume that they were intended for use as time-keepers; but what I wish to know is why was it thought desirable "to arrange a spring concentric with the movement upon the back side thereof," which, I take it, is a principal feature of that construction?

Ans. Economy of space or compactness in form, and to give the spring, if they were put in a round case, substantially all the area of the case to unwind in.

Cr. Int. 101. Now, have you a particle of doubt that the sole object of the construction which is found in that class of time-keepers of which the Hotchkiss clock is one, and which are provided with this arrangement, which, for brevity, I will call the internal gear, was to so economize space and compact the form that the movements could be contained within the circumference of the circular rack?

Ans. I have no doubt that that was one object, but I do not wish to say whether or no it is the sole object of the clocks as a class, including different kinds, without having examined carefully more than one of such clocks with that question in view.

Cr. Int. 102. Do you now know of any other object of such construction?

Ans. I do not.

(Adjourned until Feb. 23d, 1883, at 10 a. m.)

83 Examination resumed.

NEW HAVEN, *March* 6, 1883—10 o'clock a. m.

Examination of JAMES SHEPARD continued.

Cr. Int. 103. In that construction of clocks in which the circular rack or planet wheel is employed, so that a spring concentric to the movement and upon the back side of the movement may be employed, is not a division of the train by a plate, in the sense of separation of the forward part from the backward part, a necessity of the construction?

Ans. No.

Cr. Int. 104. In what manner can the two parts be arranged in that way without a division plate?

Ans. By placing the circular rack opposite the edge of the movement, so as to surround the train, instead of back of it.

Cr. Int. 105. I don't clearly understand that.

Ans. I will explain farther: Suppose the movement is mounted in a frame which revolves, and that it carries all of the train except the circular rack; then place the transmitting or intermediate wheel, which drives the center pinion, in between the two clock plates with the rest of the train, thus arranging the circular rack around the rest of the train, and so as to mesh into said connecting wheel. This I understand to be the construction of clocks which employ a circular rack, and which existed prior to the date of Hotchkiss' patent. In other words, I believe that the trains of clock movements having an internally-toothed gear prior to the date of the Hotchkiss patent were not divided into two parts by means of plates. This being the case, it follows that such a division is not a necessary feature of clock trains employing the internal gear or circular rack.

Cr. Int. 106. I intended to limit my question to such constructions as employed a fixed instead of a rotating movement. With that limitation please answer the 103 cross-interrogatory.

84 Ans. The answer is the same, but the manner of carrying it out will differ by making the internally-toothed gear or circular rack to rotate around the movement. When a stationary rack and fixed movement are employed, as in the Hotchkiss patent, then it is necessary to divide the train by a division plate, or its equivalent—that is to say, no other way now occurs to me of arranging such parts.

Cr. Int. 107. From what does that necessity result which you have last referred to?

Ans. From the fact that the planet wheel revolves around the center shaft and that the other wheels are fixed in front of it.

Cr. Int. 108. In the defendants' clock is the main spring concentric with the movement?

Ans. No.

Cr. Int. 109. Is the main wheel concentric with the movement?

Ans. No.

Cr. Int. 110. In the clocks that you have referred to as containing

the "ordinary clock movement" is either the main spring or main wheel concentric with the movement?

Ans. Not in most ordinary movements.

Cr. Int. 111. In those constructions to which you have just now referred, when the internally-toothed rack is employed concentric with a revolving movement, is not the revolving movement fixed in the frame which revolves?

Ans. Yes.

Cr. Int. 112. And does not that frame serve to divide the movement proper from the other parts of the mechanism in the sense of separating one from the other, or arranging the two parts in different compartments?

Ans. No; the trains in those clocks are all arranged in one compartment so far as I have observed.

Cr. Int. 113. You mean, I suppose, that these two parts, the movement in the rotating frame and the other part of the mechanism, are both arranged in one frame for the purpose of being held together in some way?

Ans. No; I mean that the train is all arranged within one chamber, of which the circular rack forms the boundary walls, and
85 that said circular rack must necessarily mesh directly into the rest of the movement, and be thus connected in order to make an operative clock. The movement frame is open on its edges to purposely bring it within the same chamber with the encircling rack or internal gear, and without any division plate or other device between it and said gear.

Cr. Int. 114. Is the main spring in that construction in what you call the chamber?

Ans. No; it is back of it.

Cr. Int. 115. What separates the spring from the rest of the train?

Ans. A division plate.

Cr. Int. 116. In the Hotchkiss train I understand you to find two parts divided at a point between the center wheel and center pinion; is that so?

Ans. Yes.

Cr. Int 117. In point of fact the pawl and ratchet are interposed at that point of the train and in some sense separate the one part from the other; is not that so?

Ans. The ratchet and pawl are so located, but in my opinion they in no sense separate the train. On the contrary, they absolutely connect the train, and the patent describes the pawl as of a peculiar construction, so that either one or the other of its ends must always engage the ratchet and thereby make it absolutely impossible to disconnect the train at that point, but at the same time to allow for one part to turn backward independently of the other, while they are constantly connected. I do not see how such a positive connection can be properly called a separation in any sense.

Cr. Int. 118. Do you think that the plate that you call the division plate can be properly said in any sense to separate one part of the train from the other?

Ans. No; not in any such sense as will imply that they are dis-

connected. The division plates only divide the train into two different parts, which parts, although divided by the plates, are at the same [time] connected instead of separated.

Cr. Int. 119. I have said nothing whatever and implied nothing whatever about a disconnection of the train; my question is simply whether in any sense the division plate can be properly said to separate one part of the train from the other?

86 Ans. In my opinion, the word separate ordinarily implies a disconnection. The division plate in the Hotchkiss clock divides the train into two parts, and if the word separate is confined strictly to a grouping together of certain parts of a train, in that sense it might be applied to the division plate; but I do not think it can be used without implying something more than a division by grouping two parts of the train together, and if it does imply more it is not correctly applied to the division of the Hotchkiss train.

Cr. Int. 120. Then I understand you to suppose that the word separate ordinarily implies a disconnection, and the word divide never to imply a disconnection; am I right?

Ans. No; you are not right, for divide may sometimes imply a disconnection, and for that reason I have taken care to say in my testimony of the Hotchkiss train, that it was the division of a connected train, and the Hotchkiss patent also takes pains to say that is is divided, but not disconnected. I suppose this language is used in the Hotchkiss patent, because the word divide might in one sense imply disconnection if used without any qualification.

Cr. Int. 121. Then you think that the word divide in the Hotchkiss patent has a different signification from the ordinary signification of the word separate; is that so?

Ans. Yes; I think there is a distinction between the two.

Cr. Int. 122. Now, why doesn't the pawl and ratchet, which is interposed between the center wheel and center pinion of the Hotchkiss train, divide it in the sense you give to that word, as well as the plate which does not intersect the train at that point?

Ans. Because its peculiar and only office is to connect the center wheel and center pinion instead of to divide them.

Cr. Int. 123. Does the middle plate disconnect the train in any sense?

Ans. No.

Cr. Int. 124. Suppose the pawl and ratchet to be removed from the Hotchkiss train and the spring wound up, would the train go?

87 Ans. The supposition is an impossible one, unless it is explained to me how the spring will be wound up when the pawl and ratchet is removed. The clock would not go in any sense without the pawl and ratchet.

Cr. Int. 125. Could not the spring be wound up after the removal of the pawl and ratchet, and would it not operate what you call the back part of the train?

Ans. It could not be wound up in the ordinary sense of that term as applied to clock springs, because it would unwind the moment that the power used in tightening up its coils is released; in thus running down immediately the rear part of the train would revolve rapidly.

Cr. Int. 126. While the rear part of the train was revolving under the power of the spring what would be the condition of the forward part of the train?

Ans. It would not move.

Cr. Int. 127. And the two parts of the train would therefore be disconnected, would they not?

Ans. The two parts are disconnected when the ratchet and pawl are removed.

Cr. Int. 128. And, therefore, the presence of the ratchet and pawl at the point where they are placed by the patentee is necessary to connect his train in operation, is it not?

Ans. Therefore the ratchet and pawl at some portion of the train are absolutely necessary in order to make an operative clock which can be wound in the ordinary manner. It is not necessary that the ratchet and pawl should be located between the center wheel and center pinion.

Cr. Int. 129. Do you mean to say that by simply moving the ratchet and pawl to some other part of the train than that where the patentee locates it that his train would operate without doing anything more?

Ans. Yes; without doing anything more than is necessary to bring the ratchet and pawl into operative connection.

Cr. Int. 130. You mean by that, I infer, that it would be necessary to rigidly connect the center wheel and center pinion and to make a disconnection at some other part of the train; is not that so?

Ans. No; I mean that it would be necessary to properly connect the center pinion and center wheel with the center shaft, and to make the ratchet, wherever it is located, capable of moving backwards independently of the parts which it drives.

88 Redirect examination by Mr. MITCHELL:

R. D. Int. 131. You have been asked in cross-examination many questions involving a comparason between the Hotchkiss train and movement on the one hand and the corresponding portions of the Lane clock upon the other hand. State whether you have prepared or caused to be prepared drawings exhibiting the correspondence between the Hotchkiss clock and the Lane clock; if so, produce the same and explain.

Ans. I have had such drawings prepared under my direction; the same were made from the parts found in the clocks "Shepard Exhibits A & B." In these drawings I have arranged the separate elements in parallel columns under the head of Hotchkiss clock and Lane clock, and between these columns I have had printed the terms to designate the several parts.

(The drawings referred to are laid in evidence and marked Complainants' Exhibits "Shepard Drawings '1,' '2,' '3,'" respectively, with name of notary.)

On Drawing No. 1—

First is shown the pendulum balls, which are the same size.

Next is shown the pendulum rods, which are of the same general

form and substantially the same length, and both of them having a bend at the upper end by which to secure them to the verge, and the usual threaded lower end of both of them is provided with a square nut.

The verges are next shown, both of which have a hole to receive the pendulum rod, and the pallets in the verge are alike in their action and in the distance from each other.

The verge shafts are the same size and substantially the same length, although they are pivoted differently within the frame.

The crown wheels, crown-wheel shaft, and crown-wheel pinion are alike in size, and with respect to the number of teeth or leaves of the wheels and pinions and the shafts are of the same length between their shoulders.

89 The same is true with reference to the first wheel back of the escapement wheel and its shaft and pinion.

The same is also true with reference to the second wheel back of the crown wheel and its shaft and pinion.

On Drawing No. 2—

The same is also true with reference to the third wheel, its shaft and pinion.

The center wheels are of the same size and have the same number of teeth.

The center shafts are substantially alike in size and length, and they both are squared at the rear end for the application of a key for setting the pointers, and they are both round at the front end, where the minute hand is to be attached. Both of them are provided with a collar and a shoulder to govern the position of the center wheel and center pinion thereon.

The center pinions have the same number of leaves.

The driving gears differ from each other, the one being the ordinary main wheel and the other being a circular rack and planet wheel They both have teeth of substantially the same size and of about the same number; that is, the Hotchkiss driving gear or circular rack has sixty teeth, and the Lane driving gear has fifty-six teeth.

The rachet and pawls are somewhat differently constructed, but they both have the same functions in the clock movement. The ratchet in the Hotchkiss clock is located on the center shaft, and in the Lane clock upon the main shaft.

In the Hotchkiss clock the main shaft is hollow, and in the Lane clock it is solid. Both of them are provided with a screw-thread for the application of a threaded key for winding; in one of them the thread is an internal thread, and in the other it is an external thread.

In "Shepard Drawing No. 3" the keys and the dial work are shown. The pinions which go upon the center shaft and in front of the front movement plate are designated the first dial pinion. They are alike in size and number of teeth.

The wheels which mesh into said dial pinions are designated in said drawings as first dial wheel, and they are of the same size and

contain the same number of teeth, and the shafts upon which they are mounted are the same in both clocks.

90 The second dial pinion and the second or next dial wheel are also the same in both clocks and they are of the same size, and contain the same number of wheels and teeth.

The keys are substantially alike in both clocks, both of them having a squared hole in one end of the handle for turning the center shaft, and both of them having their hubs threaded for screwing them upon the main shaft, the Hotchkiss key having an external thread for that purpose and the Lane key an internal thread.

Recess until 2 p. m.

Examination resumed 2 p. m.

R. D. Int. 132. State what would be the effect of attemping to place the driving gear of the Hotchkiss clock in front of the middle plate with reference to the pendulum, and say whether or not the same effects would be produced by the same means in the Lane clock?

Ans. It would interfere with the swinging of the pendulum, which is arranged between a front and middle plate. The same effect would be brought about by the same change in the Lane clock.

R. D. Int. 133. Your attention has been called in cross-examination to the original Hotchkiss patent and to one or more of the places in which a going barrel or concentric going barrel is spoken of as forming a part of the clock described therein. Will you say whether the Hotchkiss clock contains any going barrel as that term is employed in the art of clock and watch making?

Ans. It does not and that term is incorrectly used in said patent.

R. D. Int. 134. State whether you regard the specification as defective on that account.

Ans. I do, because it is inaccurate and because it is misleading.

R. D. Int. 135. In reply to cr. int. 79 you say that it was one object of Hotchkiss to so arrange the trains that the parts may

91 be used with a "stationary and fixed movement." In which, if any, of the claims of the reissue is the improvement secured by which that object is accomplished?

Ans. In the ninth claim.

R. D. Int. 136. Suppose the Hotchkiss clock should have its train disconnected by removing the element or device which is spoken of in the patent as connecting the two parts of the divided train; what device or element would be removed? And explain.

Ans. The center arbor, as the patent specifically states with reference to the divided train, as follows: "The two parts being connected by the center arbor."

R. D. Int. 137. In the Lane clock made by defendants how would the parts of the train be disconnected at the same point?

Ans. In the same way—that is, by removing the center arbor.

R. D. Int. 138. Please say whether any of the first eight claims of the Hotchkiss reissue in suit specify any invention or improvement not contained in the clock described in the original patent to

Hotchkiss and embodied in the Patent Office model as represented by the certified duplicate in evidence.

Ans. They do not.

R. D. Int. 139. Could the division of the train by means of the middle plate be omitted in the "Lane clock" and the same efficiency of result secured within the same space now occupied by it?

Ans. It could not.

R. D. Int. 140. With reference to the object to be secured, is the division of the train necessary in the Hotchkiss clock any more really than it is necessary in the Lane clock as made by defendants?

Ans. With reference to what is stated in the original patent as the leading object of the Hotchkiss invention, viz., to render it possible to make a cheap, neat, and satisfactory time-piece of unusually small size, such division of the train is just as necessary to the Lane clock as it is to the Hotchkiss clock.

JAMES SHEPARD.

Attest: JOHN B. MILLS, *N. P.*

92 Examination resumed.

NEW HAVEN, *Feb.* 23, 1883—10 a. m.

Present: Counsel as before.

Deposition of George Terry.

Direct examination by Mr. MITCHELL:

Interrogatory 1. What is your name, age, residence, and occupation?

Answer. George Terry; age, 67; residence, New Haven, Conn.; occupation, solicitor of patents in part, and in part examining and comparing machinery, patents, and inventions for the purpose of determining questions of infringement and patentability, and for the purpose of acting as expert in connection with patent litigation.

Int. 2. Have you read and do you understand reissued letters patent to Arthur E. Hotchkiss, No. 10062, dated Mar. 14, 1882, upon which this suit is brought?

Ans. I have read the patent and I think I understand the invention contained therein.

Int. 3. Have you also read the testimony of Mr. John E. Earle, the expert of the defendants?

Ans. I have.

Int. 4. State whether you concur with Mr. Earle in his theory, as expressed by him, as to what constitutes the division of the train in the Hotchkiss patent referred to, and in giving your answer state your view fully, and illustrate by any models you may desire to use.

Ans. I do not concur with the defendants' expert. I hold in my hand a center shaft, on which is arranged a center wheel and center pinion. The spring or flat disc is removed from its place and at-

tached to the string holding the tag, in order that the parts may be readily turned by the fingers. In this center shaft, provided with the center wheel and pinion, "the center wheel and center
93 pinion are independent of each other upon the center shaft—that is, disconnected, in contradistinction to being rigidly connected, as in the usual construction." This quotation is from the testimony of the defendants' expert, taken from page 62. The defendants' expert further says: "It is in this division of the train that I understand the Hotchkiss invention to consist." If the Hotchkiss invention is this division of the train, or if this division of the train constitutes the Hotchkiss invention, if, in any sense, it can be called a division, and if this invention is embodied in the Hotchkiss clock, then the Hotchkiss clock is inoperative and worthless, and so is any clock to which it can be attached. But, in looking at the testimony of the defendants' expert, I am constrained to believe that he unintentionally omitted to add after the words "usual construction," in the first quotation, the following words: "And interposed between the center wheel and center pinion a pawl and ratchet." I am persuaded that this was an unintentional omission and that he intended to place those words in that place; otherwise he has made no clear and concise statement of what he understands the Hotchkiss invention to be. But with this amendment we have a clear and concise statement, made by the defendants' expert, as to what he considers the invention of Hotchkiss, in so far as the division of the train is concerned. I am also persuaded that the words above mentioned were unintentionally omitted, in view of the fact that the defendants' counsel, in connection with the above quotations, put in evidence the exhibit marked Defendants' Exhibit "Hotchkiss Center Shaft." I present the center shaft first referred to me, to be marked Complainants' Exhibit "Inoperative Center Shaft," J. B. M., N. P.

The word "division," as applied to clock movements and to clock trains, is used in a well-known sense and is always used to denote a separation of one or more wheels from the other part of the train, or from other wheels, by means of a plate or bridge. In proof that it is so used I will quote from the patent issued to Frederick A. Lane [on] April 25th, 1882, the number being 257,025. The application for this patent, as appears from the patent, was filed January 25th 1882. This application, then, was pending before the Commissioner of Patents at the same
94 time that the reissue application of Hotchkiss was pending. I will quote from this patent as follows: "B is the vertical division plate arranged between the front and rear plates. * * * E is the main wheel shaft, which takes its bearing in the rear plate A and division plate C, the main wheel F, and the spring G, arranged on the said shaft in substantially the usual manner, and between the rear plate and the division plate, as seen in Fig. 2. H is the center shaft, taking its bearing in the rear and front plates and extending through the division plate. It is provided with a pinion, I, between the rear and division plates, into which the main wheel works, and from which the train of gearing,

which is arranged between the division plate and the front plate, is operated. By employing a division plate and arranging the main wheel and its spring upon one side of that plate and the balance wheel on the opposite side I am enabled to bring the balance wheel and its connecting mechanism in front of the main wheel."

The "connecting mechanism" in the above quotation includes the lever, the pallets, the escape wheel, on its arbor carrying a pinion, and the center wheel and the intermediate wheels.

The words middle, center, intermediate have been applied to the plates in a frame having three plates. Those words denote the position of the plate as between the front and back plate. In this patent the word division plate is used, and it denotes the double function which the plate performs, viz., the function of supporting the ends of the arbors and the function of dividing the train or separating the parts of the train. It will be noticed that the center shaft in this clock movement is like the center shaft in the Hotchkiss movement—that is, it extends from the front plate through the division plate to the back plate. In this movement the division plate, as it is called, performs the same function, and in the same way, and in the same place, so far as dividing the train is concerned, viz., between the center wheel and center pinion, that the middle plate performs in the Hotchkiss movement—that is, it divides or separates the train between the center wheel and center pinion. The middle plate in the Hotchkiss movement is identical with the division plate in this Lane patent, so far as its operation is concerned or function is concerned. In looking at the drawing of the patent I find that the name Frederick A. Lane is signed by his attorney, John E. Earle, who is the defendants' expert in this case. I present this patent, to be marked Complainants' Exhibit "Lane Patent, April 25, 1882," J. B. M., N. P.

I have in my hand a Hotchkiss movement in which the ratchet is placed back of the rotating disc, as the clock was originally constructed. It will be noticed that in dividing a train and in arranging one part of a train back of another part, while it diminishes the diameter of the movement, still tends to make it thicker, and that it becomes necessary to employ all the devices that can readily be employed to reduce the thickness of the train. It will be noticed that in the middle plate, where the pawl and ratchet are placed in the Hotchkiss clock, as shown in his patent drawing, is a vacant space, and that the introduction of the pawl and ratchet in that space fills it up. So far as the division of the train is concerned, it is wholly immaterial whether the pawl and ratchet is placed between a center wheel and center pinion or whether it is placed in the location in which it is shown in this exhibit. It would be a very idle and foolish construction to put a pawl and ratchet between the wheels and pinions which are arranged between the escape wheel and its arbor carrying a pinion, but it would make no difference, so far as the operation of the train is concerned, nor would it in any sense whatever disconnect or divide the train. I have myself worked on clocks in which the pawl and ratchet were placed between the pinion and wheel on the first arbor. By the first arbor I mean the first arbor

above the main arbor. These clocks were intended to run a month, and had heavy weights, and a pawl and ratchet was placed in the place described for the purpose of making it easier to wind the clock. So constructed the main wheel and first pinion rotated backwards in winding, but the construction of pawl and ratchet located in this place in no way divided or disconnected the train. I have seen turret clocks made in the same way. We have clock and watch movements with various kinds of connections. We have, for example, the connections of the plates by means of pillars; this is a pillar connection. We have parts arranged on arbors, center arbor, for example, generally, which are loosely arranged and are held by
96 a spring so as to cause a frictional connection, by means of which the pointers are rotated; this is a frictional connection. We have besides what we call a pawl and ratchet connection, by means of which parts are so connected that the wheel carrying the pawl may be rotated in one direction, and if rotated in the other direction will engage the pawl and communicate motion to the wheel. But it is essential to the operation of a pawl and ratchet in a clock movement that the parts be connected, and we see in the various exhibits before us that there is a connection between the main wheel and main shaft, and must be, that a pawl and ratchet may perform its function. There is still another kind of connection called a train connection, and a train of wheels and pinions are connected when they are in gear—that is, when the teeth of the several wheels mesh in the several pinions, and there is no way to disconnect a train but to "throw it out of gear," to use an expression among mechanics, and to throw it out of gear a wheel must be so far removed from its pinion that the teeth of the wheel will not mesh in the pinion. Clock and watch trains are always connected, and there is no need of means of disconnection of the train in the sense in which I have defined the word connection. Some machines, as, for example, machines for cutting threads on lathes, are provided with means by which the train may be disconnected or the teeth of the wheels so far removed from the pinions that they do not mesh in them. This is done by a movable arm on which a wheel is arranged. In the Hotchkiss patent and in the Lane patent, several of them, we find that while the wheels and pinions that compose the train are divided and separated, that the divisions of the train are connected by means of a center wheel and center pinion arranged on the center arbor, which extends through the two compartments of the train, and that the divisions or parts of the train are by these means as effectually connected, although they are arranged between the three plates of the frame, as if they were arranged in one compartment formed of a frame having two plates, or in an ordinary clock frame.

(The clock referred to by the witness is put in evidence and marked Complainants Exhibit "Hotchkiss Ratchet on Main Arbor," J. B. Mills, N. P.)

97 I have here another exhibit, marked Complainants' Exhibit "Lane Ratchet on Center Shaft." This construction in no

way alters the operation of the movement, but it is a very awkward construction in this size of movement, but in no way affects or changes the division or connection of the train.

Int. 5. Is there any reason whatever why Exhibit "Hotchkiss Ratchet on Main Arbor" does not embody each of the inventions described in the Hotchkiss patent in suit and specified in the first eight claims?

Ans. There is none whatever, nor is the object which he had in view in any way affected by it. The division of the wheels and pinions which compose the train and their arrangement between the three plates of the frame, as claimed by the first claim, is in no way affected by them. In the second claim the middle plate or "division plate" which supports the arbors and separates the wheels and pinions operates in the same way, no matter where the ratchet is placed. The same is true of the third claim. The means of connection as embraced in the fourth claim are in no way affected by the location of the ratchet, and the improvement claimed in the fifth claim, consisting of the three wheels, suitably fastened on arbors carrying pinions and arranged between the escape wheel and its arbor carrying a pinion and the center arbor carrying a center wheel and center pinion, are in no way affected by the location of the ratchet. The circular arrangement of the wheels as set out in the sixth claim is in no way affected by the location of the ratchet. The same is true in regard to the location of the pivots as claimed in the seventh claim, and the combination claimed in the eighth claim is in no way affected by the location of the ratchet.

Int. 6. Is there any reason why Exhibit "Lane Ratchet on Center Shaft" does not embody the combination specified in the claim of letters patent No. 237,028, dated January 25, 1881?

Ans. That claim covers this construction of Lane's clock just as much as the other.

(The Exhibit "Lane Ratchet on Center Shaft" referred to by witness is put in evidence, and is marked Complainants' Exhibit "Lane Ratchet on Center Shaft," J. B. Mills, N. P.)

98 Int. 7. Say whether or not you find in the specifications of the Hotchkiss reissued patent a statement or definition of the sense in which he uses the word "divided" in speaking of the train. If so, please state what it is.

Ans. In the disclaiming paragraph I find a clause in parenthesis in which he defines the sense in which he uses the word, and he says that the sense in which he uses the word is "parts of trains have been arranged between different plates but not disconnected." I understand him to mean by this that parts have been arranged between different plates but not disconnected, thereby making a negative affirmation, as we sometimes call it, and I understand him to state that parts have been arranged between different plates and connected just as effectually and perfectly as though they were arranged in one compartment formed by a frame having only two plates.

Int. 8. Gathering your information from the specification, what

do you understand to be the manner and means of establishing the connection between the two parts of a train separated as described in the Hotchkiss reissue?

Ans. I find the means for connecting the divided parts, the center wheel and center pinion, arranged on the center shaft, and so arranged that the center wheel shall be in the front compartment of the frame and mesh with its pinion in the front compartment, and that the center pinion shall be so arranged as to be in the back compartment and mesh with the wheel in the back compartment which drives. These are the means by which the connection is effected, and are embraced in the fourth claim of the patent.

Int. 9. Is there any difference between plaintiffs' and defendants' clocks with reference to the manner or means of connecting the divided trains?

Ans. They are the same, and the means are the same, and they are the means I have before stated.

Int. 10. Do you find any reason in any of the minor differences between the clocks described in the Hotchkiss reissue and the clock of defendants, pointed out by defendants' expert, which prevents defendants' clock from embodying all the improvements specified in the first eight claims of the Hotchkiss reissue?

99 Ans. In the defendants' clock I find a mechanical substitution for the rack and the devices for connecting the rack with the center pinion. This substitution is the employment of a main wheel instead of those devices, and in this repect I concur with F. A. Lane, whom I regard as a good practical expert, in his statement in answer to int. 32. To your question generally I answer I do not.

Int. 11. What have you to say in reply to the position of defendants' expert that the claims of the Hotchkiss reissue disclose no patentable invention excepting as his theory as to a disconnected train is adopted?

Ans. On his theory that the whole invention consists, as stated by him on the top of the 62d page of this testimony, in reply to int. 5, as I understand the same, if that theory is correct there is no invention at all, for the clock would be inoperative and worthless. The clock as described by him in that place could not be wound. If we look to the first claim there we find that it is for a division of the wheels and pinions which compose the train at a certain place on the center arbor and the arrangements of the parts of the train which are divided between the three parts of the frame. The invention consists, or the object of the invention is, I should say, to reduce the size of the movement, and this is effected by the division of the train as claimed and by the arrangement of the parts of the divided train between the three plates of the frame. In the second claim the invention consists in arranging the middle plate so as to divide the several wheels and pinions composing the train into two parts for the purpose of their arrangement between the plates of the frame. The third claim is for substantially the same thing—that is, for the middle plate dividing the train in the place specified and in the arrangement of the division between the three plates.

In the fourth claim I find that the inventor has patented the means whereby he connects the divisions of the trains so that they operate as perfectly as though they were not divided, but were arranged in a frame having only one compartment formed by a frame having only two plates. The fifth claim is for a certain number of wheels and pinions arranged between the escape wheel and its arbor carrying a pinion and the center arbor carrying the center wheel and
100 center pinion, as set forth. Without specifying further, the object of the first eight claims is to reduce the size of the movement—to make a compact movement—and each and every one of the inventions embraced in these eight claims are directed and contribute to that end, viz., the reduction of the size of the movement. Now, as each and every one of them contribute to that end, I look upon them as containing patentable invention.

Int. 12. Please say whether these supposed rearrangements of defendants' Exhibit "Defendants' Clock, Rearranged Pivots," take that clock out of the scope of any of the claims of the Hotchkiss reissue—I mean the first eight claims.

Ans. In the sixth claim the inventor has claimed a particular arrangement of wheels for the purpose of bringing his clock movement into as compact a form as possible. So long as this construction is substantially adopted and copied it comes within the claims of the patent, and although in this particular exhibit the pivots have been slightly altered in position, still this is copying the construction which the inventor has claimed, and does not therefore take this exhibit out of the category of being an infringing of the sixth claim or any other claim of the patent.

Int. 13. What is the meaning of the "circumferences of circles," in the sixth claim?

Ans. The circles used in these cases are all imaginary circles, and one of them is supposed to be described on the front plate and the other on the middle plate, and the pivots of the several wheels are supposed to be arranged in them. I will add in this connection that a drawing forms a part of a patent, and that the expression in the sixth claim with a reference to the drawings are clear enough, but in the claim if the words two like circles had been introduced it would have been clearer.

Int. 14. Compare Exhibit "Everitt Clock" with the combination specified in the fifth claim of the Hotchkiss reissue. Give reasons for your conclusions.

Ans. Every art has its technical language—its technical expressions and words. In the clock and watch makers' art we find the technical expression "going barrel." This seems at first like an uncouth expression, and is suggestive, perhaps—suggests the idea,
101 perhaps—that the barrel is provided with some means for locomotion. If we look to the old constructions of watches (this construction being shown in the eleventh plate of Reid's Treatise), we find the barrel there represented as a separate element, and that the main wheel has a conical piece secured to it by a pawl and ratchet, called the fusee, and that this fusee and barrel are connected by a chain. With this old construction, as the watch was being

wound there was no force communicated to the train. To correct this defect a device was introduced called maintaining power, the object of which was to impart force to the train and keep it going while the watch was being wound. Since Reid's Treatise, to which I have before referred, was published the invention of the going barrel has been made. It is an European invention, and both France and Switzerland have made claim to the invention, but the English have been very slow to adopt it. The "going barrel" consists of the main wheel and the barrel brought together and united so as to form one element by uniting the main spring, barrel, and the main wheel, and by letting them turn loosely upon the arbor to which they are secured, and by attaching the outer end of the main spring to the inside of the barrel and the inner end of the spring to the arbor or shaft on which they turn, and by placing the ratchet on the shaft and the pawl on the plate of the movement the going barrel is secured. By this arrangement it will be seen that the same force is communicated to the train while the watch is being wound as at any other time. Now, this device done away with the chain, fusee, and maintaining power, and is a much cheaper and better construction than the other devices. The "going barrel" has not been introduced to any extent in our country among clock-makers, but watch-makers use them, but among the numerous exhibits presented by the defendants in this case we have two European time-pieces in which "going barrels" are found. One of these is called the "Everitt clock," and the exhibit marked "German Clock Three-Wheel Train." Now, in this "German Clock Three-Wheel Train," from the description I have given of it, no one can fail to see the "going barrel," as it is called, consisting of the main wheel and barrel united, and forming one element. If we turn to the "Everitt clock" we shall recognize the "going barrel," consisting of the main
102 wheel and barrel united and forming one element centrally arranged, and I will add that to mistake a "going barrel," consisting of the main wheel and barrel united and forming one element, although it may be centrally arranged for a center wheel, is a getting about as far from the mark as it is possible to get. In this "Everitt clock" the "going barrel" is constructed a little different from what it is in ordinary clocks. On the same shaft with the going barrel is another wheel which is the main wheel of the alarm movement, and the arbor is divided, made in two parts, and the outer end of the main spring is attached to the inside of the barrel and the inner end to a socket which extends over and holds the divided arbor in line. There is then in this movement, "Everitt clock," no center wheel, and there is no such space in the clock as tha tdesignated by the words "between the escape wheel and its arbor carrying a pinion and the center arbor carrying the center wheel and center pinion," and there is, therefore, no place for the three wheels in the clock. In our country this technical expression, "going barrel," is well known to our watch-makers, but they do not know it by that name, all of them. If we look to the journals devoted to the art published in Europe—for example, the Horological Journal, published in London, which is the organ of the Horological In-

stitute of that city—we shall find many articles in which the properties of the going barrel are discussed. Perhaps it would be well to state how, in the going barrel, the arrangement is effected by which a uniform force may be communicated to the train which, under the old device, was effected by the fusee. And I would state that this is accomplished by using a very long main spring, and that it has been found by experiment that the last turns of a main spring impart a force to the train which is nearly equal. Hence, if there are to be six turns to the going barrel to run twenty-four hours they would make a spring long enough for twice that number of turns. In the Everitt clock the "going barrel" turns once in twelve hours, and the arbor on which it is attached extends through the arbor and carries the hand, and there is no shaft in that clock carrying a minute hand, and no center wheel in the sense in which that wheel is described in the patent.

103 Int. 15. If you have prepared any diagram to illustrate the importance of that combination in which the center shaft, carrying wheel, and pinion is combined with the escape wheel and pinion by three intermediate wheels and pinions in reducing the size of movements, please produce and explain the same.

Ans. I have prepared the diagram, and the diagram consists of two figures, showing two trains of wheels, in one of which there are three wheels and an escape wheel, and in the other there are two wheels and an escape wheel. The teeth in the wheels in both trains have the same coarseness, and the pinions of course are of the same size in the two trains. One turn of the lower wheel in each train turns the escape wheel the same number of times, or sixty-four revolutions. Now, by comparing these two trains together it will be seen that the train with two wheels occupies double the space of the train with three wheels, and if we reduce the two wheels and pinions so that they will occupy the same space that the three wheels occupy the teeth in the wheels will be as fine again and the pinions reduced to one-half the size, and of course the pivots.

(The diagram referred to is put in evidence and is marked Complainants' Exhibit "Terry Diagram," J. B. Mills, N. P.)

Int. 16. Are you familiar with Reid's Treatise? If yea, state whether you find any suggestion or indication in said treatise that any one had ever discovered the way of producing a very diminutive movement having the large pinions and large-toothed wheels of full-sized clocks that is set forth in the fifth claim in the Hotchkiss reissue.

Ans. My father had Reid's Treatise on Clock Making, and he made clocks—brass clocks—prior to the introduction of the cheap sheet-metal clocks. I worked with my father at the trade of clock-making and repairing watches from the the time I was old enough to work until I was about nineteen or twenty years of age, and at intervals afterwards. I used to peruse that treatise, and used to have it explained to me, and I have never found anything in Reid where the principles in clock or watch making of increasing

104 the number of wheels to produce a given number of turns was recognized, and I believe this to be a new principle in clock and watch making. I have never seen this principle recognized in any other treatise or in any journal devoted to the art, and I believe that the embodiment of this principle is new, and was first shown or carried into effect in the Hotchkiss movement. In other words, I believe the principle to be new, and the means by which the principle is carried into effect to be new.

Int. 16*a*. What have you to say in reply to the references to Reid's Treatise by defendants' expert?

Ans. The tables in Reid relate to the number of teeth in the wheels and leaves in the pinions for producing a given number of turns of the escape-wheel arbor, but I have never seen any tables in Reid to determine how many wheels there should be in a clock train or how many wheels in a particular place in a clock train.

Int. 17. Compare Exhibits "German Clock Three-Wheel Train," Exhibit "Brown Clock," Exhibit "Hubbell Movement," and Exhibit "Davies' Patent" with the invention of Hotchkiss specified in the first eight claims of his reissue, saying whether or not you find in any one, or all of them, the subject-matter of any one of said eight claims.

Ans. I do not find in any one of these exhibits the invention contained in the first eight claims of the Hotchkiss reissued patent.

Int. 18. Is there any difference between Defendants' Exhibit "Defendants' Center Shaft" and Defendants' Exhibit "Hotchkiss' Center Shaft" when they are compared, with reference to the subject-matter of the first eight claims of the Hotchkiss reissue?

Ans. The difference in the two shafts consists in the fact that the "Hotchkiss center shaft" has a pawl and rachet interposed between the center pinion and center wheel; it has a slit brass pinion, and the spring for the frictional connection is between the rachet and center wheel. In the Defendants' Exhibit "Defendants' Center Shaft" the center wheel and center pinion seem to be rigidly connected, and the pinion belongs to that class which are called lantern pinions.

105 The spring for causing the frictional connection is placed on the opposide side from the pinion of the center wheel. These are details of construction and do not relate to the first eight claims of the Hotchkiss reissue patent.

Int. 19. What have you to say of the several "Earle models" showing clock trains?

Ans. The three exhibits which embrace the invention of Hotchkiss are pretty fair illustrations of the value of his invention. The train which is called the "six-wheel train" is also a pretty good illustration of the new principle, and also illustrates how easy it is to do a thing when you have been shown how. No such trains as these were ever found prior to the Hotchkiss invention to my knowledge. We have another exhibit here called "four-wheel train," and it was to get rid of such miserable trains as this, if it can be called a train, with these pinions with the low number of leaves. I do not regard this as a practical clock train; it might, possibly, answer the purpose, but no clock-maker would use such a train as that, or

call it a good train. It might do for a train for some of these sheet-metal clocks.

Int. 20. Compare the size and fineness of work of the pinions and of the first wheel in Exhibit "Earle Four-Wheel Train" with the corresponding parts in the trains of plaintiffs' and defendants' clocks.

Ans. In the first wheel the teeth are finer, and must necessarily be so with those low numbers. The pinions are very small and have few leaves—only six. The teeth in the "Earle four-wheel train" are very fine compared with the complainant's or defendants' clocks. In some of the wheels the teeth are coarse and all out of proportion.

Hearing adjourned until February 24th, 1883, at 1 oclock a. m.

106 Examination resumed.

NEW HAVEN, *Feb.* 24, 1883—10 o'clock a. m.

Present: Counsel as before.

Witness continues: In this train ("Earle four-wheel train") if the Hotchkiss improvement was introduced we could have a train that would take up no more space than this train does, and have pinions with eight leaves, higher number of pinions, which would impart a more uniform force to the pendulum, and the train so embodied in this improvement would in every respect be better than this "four-wheel train" is, as it is called.

Int. 21. Please read Mr. Earle's reply to int. 9 of his deposition and state your reply to it.

Ans. Mr. Earle says as follows: "It is and must be in all movements of this character—that is to say, movements in which an internal toothed stationary circular rack is employed, and in connection with which the planet-wheel is employed to impart or communicate power to the train." In answer I would say that there was no movements of this character prior to the Hotchkiss invention. Movements had been made with internal gears, but the planet wheel mounted on the circular disc was the invention of Hotchkiss. Prior to the invention of Hotchkiss clocks had been made with frames having only two plates, and such clocks had been made both with main wheels and racks, either rack or main wheel, as desired, being used. Trains constructed in this way with a rack had been made in two ways. In one of the ways the rack was fixed and the frame of the movement was stationary. This form of construction allowed the use of a pendulum. In clocks in another form of construction the rack rotated and the frame was stationary. This form of construction allowed the use of a pendulum. In another form of construction the movement with the exception of the rack rotated. This only allows of a balance wheel. It will be seen then that all the elements of the train which Hotchkiss used had been embodied
107 before in a clock having only two plates. The starting point in the Hotchkiss invention, as I understand it, was the division of the train, and when he had divided his train he had all the same old elements to work with that he had before. He had

main wheels and racks, and he could use one or the other in his train after he had divided it as he used them before, before it was divided. Having divided his train and selected his rack instead of a main wheel, there was a necessity for some means to connect his rack with the center pinion and to connect the main spring with his train; hence the rotating disc carrying the planet wheel. The division of the train in case he used the rack instead of the main wheel necessitated this contrivance which is embraced in his ninth claim. Where there is no division of the train which Hotchkiss used there is no necessity for this rotating disc and planet wheel.

Int. 22. How long would it take a clock manufacturer, having all the ordinary and customary facilities and the letters patent to Lane under which the defendants' clock is claimed to be made, but with no tools or apparatus special to that particular clock, to get that clock or clock movement into the market in merchantable shape?

Ans. The question reminds me of the remark of one of our manufacturers when he presented a gun for me to look at. He stated that the gun cost him $80,000. I understood him to mean that the tools and appliances for making the gun cost that and not the gun. As my experience in clock making was prior to the sheet-metal clocks, and all the work was cast—the wheels were cast and plates made (and we made decent clocks)—I don't think that my opinion as to the time it would take to get up these dies and tools would be entitled to any very great respect, and for that reason I wouldn't state any definite time; but I have noticed, as I have taken out patents for new inventions, that when the patents were for machines the time occupied in making the machines and getting them ready for market varied from six months to, say, three years—perhaps sometimes longer. I have never had any experience in getting up these dies, which I understand constitutes very considerable portion of the tools necessary. I couldn't state any definite time.

Int. 23. I find in the statement of invention in the original
108 patent to Hotchkiss that a spring "barrel" is to be employed, and in the clause which begins "The nature of said invention consists" I find that a concentric "going barrel" is referred to as an element. Please say whether the Hotchkiss invention has in it any barrel or going barrel of any kind.

Ans. American manufacturers of cheap clocks do not ordinarily enclose the spring of their movement in a barrel, and there is no barrel in the Hotchkiss clock enclosing the main spring. A concentric going barrel, if that term is used in its technical sense, would denote the element which we find in the Everitt exhibit. There a centrally arranged going barrel is found which has been mistaken for a center wheel of a movement. There is no going barrel in the Hotchkiss movement in any proper sense of that term.

Int. 24. State whether or not, in your opinion, that description to which your attention has just been called was calculated to mislead.

Ans. It would mislead all those who use that term in the technical sense in which it is employed in the art.

Int. 25. Please say whether or not the original model filed in the

Patent Office in connection with Hotchkiss' original application, as represented by the certified duplicate marked Complainant's Exhibit "Patent Office Model," contains all the inventions and improvements described in the Hotchkiss reissue in suit, as specified in the first eight claims.

Ans. It does.

Int. 26. State whether the drawings of the original patent and of the reissue in suit are substantially the same.

Ans. They are, substantially. In Fig. 1 the original patent shows one of the dial wheels; that doesn't appear in Fig. 1 of the reissue. By leaving out the dial wheel some of the other parts are more distinctly shown, but the parts that are more distinctly shown in that figure are well enough shown in Fig. 6 of the reissue and also by Fig. 6 of the original patent, so that any clock-maker would understand it.

Int. 27. Does the omitted dial wheel of Fig. 1 have anything to do with any of the inventions patented in the reissue?

Ans. It does not; in the dial work there is no novelty in this clock.

109 Int. 28. Do the drawings of the reissue contain anything not found in the original model?

Ans. They do not.

Int. 29. I understand you wish to add to your answer to int. 26; if so, please do so.

Ans. In the original patent in Fig. 1 the center wheel and the wheel next forward of it in the train are not as distinctly shown as they are in the reissue, but when we take into connection the other figures—as, for example, Fig. 6—one skilled in the art would find all the elements shown in the reissue.

Int. 30. State whether or not the improvements specified in the first eight claims of the reissue are all contained in the clock described in the original patent.

Ans. They are all contained in the clock described in the original patent.

Cross-examination by Mr. INGERSOLL:

Cr. Int. 31. Does Fig. 1 of the drawing of the original patent show at all more than one wheel between the center wheel and the escape wheel even indistinctly?

Ans. It shows the wheel meshing in the escape wheel pinion and a small portion of another wheel belonging to that part of the train.

Cr. Int. 32. How many pivot holes does it show for wheels between the center wheel and escape wheel?

Ans. One.

Cr. Int. 33. Then that figure does not show any train between the center wheel and escape wheel composed of more than one wheel, does it?

Ans. It shows one wheel and a portion of another, as I have before stated.

Cr. Int. 34. What is the other wheel?

Ans. I understand it to be a portion of the train.

Cr. Int. 35. What are the wheels for which the two pivot holes are shown in that figure?

Ans. They are for the pivot of the escape-wheel arbor and for the pivot of the arbor on which is arranged the wheel which meshes in the pinion of the escape wheel arbor.

110 Cr. Int. 36. Now, in Fig. 1 of the drawing of the reissued patent, how many pivot holes are shown?

Ans. There are four.

Cr. Int. 37. And how many wheels are shown between the center and escape wheels?

Ans. Three.

Cr. Int. 38. Were you the patentee's attorney in procuring the last reissue of his patent? Did you prepare the specification of that reissued patent?

Ans. I was, and I did.

Cr. Int. 39. Did you have anything to do with preparing the specification of the original patent?

Ans. I did not.

Cr. Int. 40. Or of the first reissued patent?

Ans. I did not.

Cr. Int. 41. When you prepared the specification of the last reissued patent were you familiar with the construction of the defendants' or Lane clock?

Ans. I cannot tell at present whether I had ever seen that clock or not.

Cr. Int. 42. Had you seen at that time the patent which had been issued to Mr. Lane, under which the defendants' clock was made?

Ans. I don't think I had ever seen that patent at that time under which the defendants' clock was made, but I may have seen it. I take the Official Gazette published by the Patent Office, and generally take a look at the improvements in clocks which are patented, and it is more than probable that I had seen the drawing and claim as published in the Gazette.

Cr. Int. 43. Do you mean to say that when you were employed to obtain this second reissue of the Hotchkiss patent you were not informed by any one that the Lane clock was being made by the defendants, or that it had been patented by Mr. Lane?

Ans. At that time I think I knew Mr. Lane had a patent on a clock, but don't think the information was imparted to me by Hotchkiss. Mr. Lane, in company with a Mr. Wagner, came to my office and consulted with me about the Lane clock patent, but when that was I cannot tell. I have no idea of the date of that interview.

111 Cr. Int. 44. Do you still mean to be understood that when you were employed by the parties interested in the Hotchkiss patent to obtain this second reissue you were not advised by them that the defendants were making the "Lane clock?"

Ans. I don't know whether they said anything to me about it or not, but I think I knew or was advised that they were making clocks then.

Cr. Int. 45. Was it not understood by you and those parties, whoever they were, that they desired to obtain a reissue of that patent, which would enable them to stop such manufacture by the defendants?

Ans. There never was any such understanding. The first reissue had been submitted to me for examination in the same manner and in the same style as Mr. Lane and Mr. Wagner came to me with their patent, and I gave an opinion as to that first reissue that it was a void patent, or didn't amount to much, and when I filed in the Patent Office an application for a reissue I accompanied that application with a statement of the defects found in the first reissued patent. I did not make oath to that statement nor did Hotchkiss. The rules of the office did not require such a statement, but since then the practice which I then indulged in—of accompanying an application with such a statement—has been made a rule in the Patent Office.

Recess until 2 p. m.

Examination resumed 2 p. m.

Witness continues: When we are asked questions that require dates to be given, without any time to refresh our memory, we don't get at the facts as well as we do after a little time to think it over. With Mr. Spaulding, the druggist in Church street, who is or was a stockholder in the Yale Clock Co., I am well acquainted. Mr. Spaulding, I think, first called my attention to Lane's patent of Jan. 25, 1881, and I think I looked at that patent at that time at his request, and we had some conversation in regard to the claim, and Mr. Spaulding reported this conversation, or the result of it, to
112 Mr. Lane, and Messrs. Lane and Wagner called on me, as I have previously stated, and consulted me in relation to the claim in his patent. This was the first time that my attention was ever called to the patent of Lane otherwise than as it appeared in the Official Gazette.

Cr. Int. 46. Was it subsequent to this that the first reissue of the Hotchkiss patent was submitted to you for examination, as you have testified?

Ans. I don't know whether it was or not, but I presume so; indeed I have no practical doubt about it.

Cr. Int. 47. Who was it that submitted it to you?

Ans. It was Hotchkiss himself.

Cr. Int. 48. Then have you any doubt that when you were employed to obtain the second reissue you were familiar with the construction of the defendants' clock as then made by them?

Ans. If their clock was made in accordance with the Lane patent, I was; I was familiar with the patent.

Cr. Int. 49. If a clock train should be arranged on a center shaft, like that you have produced, marked Exhibit "Inoperative Center Shaft," might it properly be called a disconnected clock train?

Ans. With this construction the train connection would not be interfered with; that is, the teeth of the several wheels would mesh in the several pinions as before.

Cr. Int. 50. Question repeated.

Ans. I think that would convey a wrong impression to most clock-makers, the connection of the train relating to the teeth of the wheels meshing in the pinions. That constitutes what clock-makers understand by the connection of the train.

Cr. Int. 51. Without arranging the train upon it, may it properly be termed a center shaft with center wheel and pinion disconnected?

Ans. If this refers to the construction in a Hotchkiss clock, when a pawl and ratchet are introduced in this place the parts are connected. That a center wheel and center pinion may be arranged on a shaft and be disconnected is certain.

Cr. Int. 52. I repeat the question.

Ans. I have already stated that a center pinion and center wheel might be loosely arranged on a shaft and not connected
113 and in that case it would be worthless as a portion of a clock movement.

Cr. Int. 53. Now, whether it is worthless or not is immaterial. Would such a construction as you have supposed be properly called a center shaft with center wheel and pinion disconnected?

Ans. When a construction of the center wheel and center pinion are so arranged on the center arbor as to render the clock inoperative there would be no propriety in calling it by any other name than "inoperative."

Cr. Int. 54. It wouldn't do then, I suppose, to say that in this Exhibit "Inoperative Center Shaft" the center wheel and center pinion are disconnected; is that so?

Ans. It would do to call those parts disconnected, but to call such a disconnection a disconnected train would be a misnomer.

Cr. Int. 55. Would it not do to call those parts which are so disconnected "divided parts?"

Ans. I have already stated that "division," as used in the clock and watch makers' art, denotes the separation, by a plate or some other means, of some of the wheels and pinions which compose the train, and have cited patents or quoted from patents to show that that was the sense in which the word is used in this art.

Cr. Int. 56. Suppose between the wheel and pinion of this Exhibit "Inoperative Center Shaft," or, as I will now term it, "disconnected center shaft," something should be interposed so that the wheel and pinion would not be in contact or close juxtaposition, do you think that there would be any division of those parts in such a construction?

Ans. When I see what that something is I can answer the question.

Cr. Int. 57. Explain why that is necessary.

Ans. Because we use the word "divide" as relating to the separation of the parts of a train or to the plate which separates them, ordinarily.

Cr. Int. 58. Do you mean to say that the parts of a train, as clock-makers understand it, can only be divided in the sense of separating one from another by a fixed plate?

114 Ans. The plate might rotate, perhaps.

Cr. Int. 59. Whether the plate rotates or is fixed, what is your answer to the question?

Ans. I do not remember now to have seen the word "divide" as used in any other sense in the clock and watch makers' art than as I have described it, but it may be so used. It certainly is used in the sense in which I have described it.

Cr. Int. 60. Would it be intelligible to you if it was used in any other sense than that in which you have described?

Ans. I can answer that question a good deal better and tell what is intelligible to me when it is presented.

Cr. Int. 61. With your knowledge in the art of clock making, do you know of any means by which the division of the parts of a train can be made except by a plate dividing and separating those parts, as you have described?

Ans. My means include bridges as well as plates. I have seen trains which were so constructed that I think the word "division" would apply well enough to the construction, but I do not now recollect to have seen that word applied to such constructions.

Cr. Int. 62. What were the constructions that you refer to?

Ans. It was that class of trains which are called "Remontoire," in which there is a contrivance for imparting a more uniform force to the pendulum or balance wheel.

Cr. Int. 63. What is the contrivance?

Ans. The contrivance is very difficult to describe, and I have never seen a clock made in that way, but only drawings of them.

Cr. Int. 64. I understand you, then, to say that, so far as you are able to give present information, there are no means by which the parts of a train can be divided, one part from the other, other than plates or bridges; is that so?

Ans. The answer is that plates or bridges are used to divide trains, but there may be other means, perhaps, but ordinarily, as I understand things, these are the means. I have referred to one class of clocks where there was a construction to which I thought the word "division" might with propriety enough be applied.

Cr. Int. 65. Define the word "plate," as you use it in the last answer?

115 Ans. The word plate or plates, as used in clock making, are those parts in which the arbors turn on which the wheels and pinions are arranged. Frequently they perform only functions.

Cr. Int. 66. What other functions?

Ans. Well, sometimes a ratchet is attached to a plate; sometimes an arm extends or is attached to a plate for supporting the bell, and other devices are sometimes attached to a plate in order that they may properly perform their functions.

Cr. Int. 67. What is a bridge as distinguished from a plate?

Ans. A bridge as distinguished from a plate is a part attached to a plate and extends across a wheel and furnishes a support for its arbor, and sometimes it furnishes a support for the arbor on which is arranged the pinion into which the before-mentioned wheel

meshes. There are seldom more than two pivot holes in a bridge and frequently only one.

Cr. Int. 68. In the sense in which you use the word "divided," is there any distinction of meaning between the expression dividing the parts of a train and the expression arranging the parts of a train on either side of a certain point? If so, state that distinction.

Ans. In answer to the question I will quote from the Hotchkiss patent: "The train is divided into two parts between the center wheel and center pinion—that is, the center wheel, escape wheel, and pinion on its arbor, the three wheels between the center wheel and escape wheel are arranged between the front and middle plates of the train and constitute the front part of the train, and the center pinion and rack, which are connected by the planet wheel, are arranged between the middle and back plates, and constitute the back part of the train." There must be some line or point of separation before the arrangement.

Cr. Int. 69. In what way do you understand the train to be divided before it is arranged into the separate compartments of the frame?

Ans. The division refers to the line or place of separation, and the arrangement *it* denotes the place where they are arranged.

Cr. Int. 70. But I want to know what means the patentee provides for a division of the parts of the train as distinguished
116 from the means he provides for arranging the parts of a train, if there are any; but if they are the same and the division is the same thing as the arrangement, please say so. If they are different, please point out the difference.

Ans. The answer to my previous question seems to be a full answer to this question.

Cr. Int. 71. Can you give no other?

Ans. It requires no means for fixing on the line or point of separation—that is, the line we conclude from which to separate the parts of a train, but something—plates or bridges—are required for the arrangement.

Cr. Int. 72. Then I am to understand you that the division of the train is a work of the imagination, consisting of the fixing of an ideal line, on either side of which the parts are to be thereafterwards arranged; is that so?

Ans. There must be some point or line from which the division is supposed to be effected.

Cr. Int. 73. But the division itself is not practically made by any means provided by the patentee; is that your understanding of the patent?

Ans. I refer to my answer to cr. int. 68 for answer as to what the patent sets forth.

Cr. Int. 74. Now look at the first claim of the reissued patent and tell me what means are provided in that claim for the division of the train that is therein required.

Ans. The point or line of division are referred to, and this point or line of division are all the means requisite.

Cr. Int. 75. Now, in the actual construction of the Hotchkiss train,

as shown by his patent, is there not an actual part of the mechanism, and not merely an imaginary line, interposed between his center wheel and center pinion; if so, what is it?

Ans. Between a center wheel and center pinion there is a part or parts which form no part of the Hotchkiss train, and these parts are a pawl and ratchet, and in no way interfere with the line of division.

(Adjourned until Feb. 26, 1883.)

117 Examination resumed.

NEW HAVEN, *Feb.* 26, 1883—10 o'clock a. m.

Present: Counsel as before.

(The witness states that he wishes to add to the answer given on Saturday to cr. int. 75.)

Witness continues: I should be better understood, perhaps, by saying that the division of the train is effected by means of the middle plate, or by a plane coincident with the middle plate whose outline or boundary corresponds with the outline or size of the middle plate, and that the arrangement of the parts of the divided train is effected by means of the three plates.

Cr. Int. 76. Does the second claim of the patent set forth any special means of dividing the train into two parts; if so, what?

Ans. As a preface to my answer to this interrogatory I wish to correct my answer to the cr. int. 54. As the spring which belonged on the center shaft had been removed and attached to the tag or string, I did not notice it. My answer to that interrogatory should have been and is, No; there is a frictional connection between the parts, and the remainder of the answer should be struck out. The second claim set out in part as follows: "The middle plate of the frame, the said middle plate dividing the train into two parts between the center wheel and center pinion, the said center wheel and center pinion being arranged on the center arbor carrying the minute hand.

Cr. Int. 77. Who have you talked with on the subject of your answers to the cr. int. 54 and cr. int. 75 since they were given last Saturday?

Ans. In answer to the cr. int. 54, it will be plain enough to be seen how it occurred, since the spring was removed, and this occurred to me directly after I got home on Saturday night, and I have talked with no one about it until this morning, and then I did talk with Mr. Mitchell, and inquired if they would allow that
118 correction, and he said that he thought the defendants' counsel wouldn't allow it. Then I told him that I should put it in as a preface to the first question put to me this morning, and I have done so, and there has been no further conversation with any person about it. There has not been a word said by me to any one or any one to me, to my recollection, in regard to my answer to the the cr. int. 75 mentioned.

Cr. Int. 78. Do you wish to make any other corrections of your

testimony given upon cross-examination last Saturday? If you do, make the correction now.

Ans. I couldn't answer that question until I have an opportunity to look the testimony over; I have not looked the testimony over; when I have looked it over I can answer the question.

Cr. Int. 79. Do you mean to be understood that the second claim of the patent is for a division of the train into two parts by the middle plate?

Ans. I do not mean to be so understood.

Cr. Int. 80. What is your understanding, then, of the meaning of the second claim?

Ans. I understand the second claim to be for the means for effecting the division.

Cr. Int. 81. What are those means?

Ans. The middle plate, or a plane coincident with the middle plate, whose outline or boundary corresponds with the outline or size of the middle plate.

Cr. Int. 82. In what respect, then, does the 1st claim differ from the 2d claim?

Ans. The 1st claim is for separating the wheels and pinions which compose the train into two parts, and for their arrangement between the three plates of the frame; and the 2d claim is for the means of separating the wheels and pinions which compose the train.

Cr. Int. 83. In the Hotchkiss clock is there a part which the patentee calls the back of the clock case?

Ans. There is such a plate, A, which forms a part of the case, but not a part of the movement, as I understand it.

Cr. Int. 84. Is the operative mechanism of the clock attached to that plate A?

119 Ans. The Hotchkiss movement is attached to the plate A of the case by means of posts as, they are called.

Cr. Int. 85. And does that plate A protect the movement at the rear?

Ans. Yes; in the same sense that any clock case protects the movement, and in no other sense. The main spring B is attached to one of these posts at the outer end of it, and the main spring is between the back plate C and plate A, but the plate A is not essential to the operation of the movement.

Cr. Int. 86. Do the parts which you call posts, and which are marked C′ in Fig. 4 of the drawings, also hold the spring when it is unwound in conjunction with the plate A?

Ans. The parts which I call posts are called by that name in the patent. They do not operate in conjunction with the back of the case A.

Cr. Int. 87. Do they operate in that way when not in conjunction with the plate A?

Ans. The post C′ holds the main spring when it is unwound, whether the movement is in the case or out of it, as I understand it.

Cr. Int. 88. If the plate A were removed would the posts C′, prac-

tically of themselves, hold the spring so that in a practical clock the plate A might be dispensed with, so far as that purpose is concerned?

Ans. When the main spring is unwound it comes against the posts C′ and exerts against those posts a very trifling force. I think they would. When the main spring is wound up, the outer end of which being attached to one of these posts, the post is sufficient to hold the spring and made a practical clock without the case A, so that if the clock were suspended or held in any other way not in the case, it would be a practical clock.

Cr. Int. 89. Has the term "post" any technical meaning in clock mechanics?

Ans. I don't know that it has. I think it is very seldom used in clock making.

Cr. Int. 90. Has the term "pillar" a technical meaning in that art?

Ans. The term pillar is used in clock and watch making to indicate the parts which hold the plates and may well be called a technical word.

120 Cr. Int. 91. Is the term "post" synonymous with it?

Ans. In the Hotchkiss patent the word pillars and the word posts are both used, and I do not understand them to mean the same thing. The word pillars I understand in the Hotchkiss patent to mean the parts which connect the plates, and I understand that in this patent the word posts denotes the parts by which the movement is attached to the case. Incidentally the outer end of the main spring is attached to one of these posts, but if the clock were made without a case and without these posts a pin would be inserted here for holding the main spring, so that these posts constitute no part of the movement. In many American clocks the main spring is left to unwind itself, and there is no provision for holding it when it is unwound, and if these posts were not attached to the movement the Hotchkiss clock would be like them in this respect.

Cr. Int. 92. What is a "pillar plate" in clock mechanics?

Ans. This word I have seen in patents and in treatises on clocks, and it is used to denote the plate in which the pillars are placed and riveted, as distinguished from the plate which is slipped onto the pillars, and is held by pins which may be removed.

Cr. Int. 93. When, in answer to cr. int. 90, you say that the term pillar is used in clock-making to denote the parts which hold the plates what plates do you refer to? I mean in clock-making, not in the Hotchkiss patent.

Ans. In clock-making, ordinary, there are two plates—a front and a back plate—and we find ordinarily that the back plate is the pillar plate, but I think I have seen clocks where the front plate was the pillar plate.

Cr. Int. 94. And in this ordinary construction to which you refer the movement is enclosed by these two plates which you call front and back, and which are connected by the pillars; is that so?

Ans. Frequently, and I might say ordinarily, some part of the

movement is on the back of the back plate, as, for example, the main spring, and sometimes the main wheel, and the dial work is in front of the front plate.

Cr. Int. 95. These constructions that you just referred to are the ordinary, long-known constructions, are they?

121 Ans. I have known *that* the clocks with the dial work in front of the front plate and the main spring back of the back plate for forty years.

Cr. Int. 96. And in those constructions the parts of the movement between the main spring and sometimes the main wheel and the dial work was enclosed between the two plates, I suppose; is that so?

Ans. Sometimes it is so, and I have a clock in my possession now which is made in that way—that is, with the main spring behind the back plate and nothing else, and dial work in the question is rather an uncertain term, and I should prefer to say, between the main spring and front plate.

Cr. Int. 97. Now, in such constructions as you have just described, when the front plate and back plate are connected by pillars, are both those plates sometimes termed pillar plates?

Ans. I have seen in patents the expression pillar plate used in such a way that it seemed to me to have no definite meaning, and I think that in the original patent to Hotchkiss and his first reissues that it was used in that indefinite and vague way.

Cr. Int. 98. It is so, is it not, that in the original Hotchkiss patent the patentee describes two plates, one of which he calls a front pillar plate and the other the rear pillar plate?

Ans. In the original patent to Hotchkiss I find the following expression: "Figure 6 represents a detailed view of the front and rear pillar plates," and this is a fair specimen of the manner in which the original patent was drawn.

Cr. Int. 99. And did he not also in that patent describe his movement as fixed between those two pillar plates?

Recess until 2 o'clock.

Examination resumed, 2 p. m.

Ans. In the original patent plates G, J, and K are described as the plates which perform the function of plates in the technical sense in which that word is used in the art. He also describes a rotating plate, F. The word plate F, as here used, is not used in its

122 technical sense. It is within the plates G, J, and K that the principal parts of the movement are arranged with the main spring back of the plate G.

Cr. Int. 100. When in the original patent the patentee states that the nature of his invention consists partly in the "combination of a fixed, internally-toothed, circular rack and a concentric-going barrel or plate with a main spring, a transmitting wheel rotating with said barrel, and a fixed clock movement," what does he mean by the fixed clock movement?

Ans. I understand this expression in this case to refer to the movement which does not rotate, or to such a movement as would

allow of the use of a pendulum, but I would say that this original patent is so bunglingly drawn that it puzzles me occasionally to find out what it does mean, and frequently expressions are used, for example, tongues and claws, things that belong to wild animals rather than clocks.

Cr. Int. 101. Do you mean to testify here that you do not understand what the patentee intended by the words fixed clock movement?

(Objected to inasmuch as the witness has stated his understanding in the last answer.)

Ans. I suppose that the patentee referred to a movement that would allow of a pendulum.

Cr. Int. 102. Do you mean to testify that in your belief the patentee did not refer to that movement which, in his organization, was fixed between what the calls the pillar plates J and K?

(Objected to on the ground that there is no entire movement in his organization between the plates named in question, whether correctly so called in the patent or otherwise.)

Ans. I understand that the patentee includes the main spring back of the plate G, and the three plates, and the wheels and pinions and the parts arranged between them, or, in other words, the whole movement.

Cr. Int. 104. And this is as clear and intelligible an answer as you can give to that question, is it?

Ans. The answer is clear and intelligible.

Cr. Int. 104½. In point of fact the patentee does arrange all
123 the "operating parts by the time-piece," except the fixed internally-toothed circular rack and concentric going barrel, or plate with main-spring, and the transmitting wheel rotating with said barrel and the parts relating to the dial plate, between the two pillar plates J and K, does *it* not?

Ans. If I understand the question correctly, the question does not include all of the parts back of the middle plate J, the center pinion being omitted.

Cr. Int. 105. In point of fact all the wheels of the movement between the center wheel and crown or swing wheel, inclusive, are arranged between what the patentee calls his pillar plates J and K, are they not?

Ans. No; his planet wheel is arranged back of the plate J.

Cr. Int. 106. Is the planet wheel between the center wheel and crown wheel?

Ans. It is not; it is back of the center wheel.

Cr. Int. 107. Then be good enough to consider my questions before they are answered, and in particular consider again my question cr. int. 105 and answer it.

Ans. All of them except the dial wheels.

Cr. Int. 108. Is the dial wheel between the center and crown wheel?

Ans. One of the dial wheels is on the front plate, but it can't be

said to be between the center wheel and escape wheel, because it don't form part of the train.

Cr. Int. 109. Now, this same construction—that is, the construction of clock movements in which the wheels of the train between the center wheel and crown wheel, inclusive, are enclosed between two plates connected by pillars—was a known construction long before the Hotchkiss patent, was it not?

Ans. I don't know that it was; I don't recollect ever to have seen that construction before, and I believe it to be new as set out as one of the parts in the division referred to in the patent.

Cr. Int. 110. In those clocks to which you have referred in answer to cr. int. 94, where you say, "frequently, and I might say ordinarily, some part of the movement is on the back of the back plate, as for instance the main spring, and sometimes the main wheel,
124 and the dial work is in front of the front plate," what parts of the train were arranged between the front and back plate?

Ans. These parts were greatly diversified; there was great diversity among them. It would be impossible to enumerate the parts in the different clocks.

Cr. Int. 111. Speaking generally, they were the parts in an ordinary clock train that are between the center wheel and crown wheel, inclusive of those wheels, were they not?

Ans. To speak of the general construction is to speak pretty indefinitely. There had been various arrangements of these parts, and they had been variously arranged.

Cr. Int. 112. If in any ordinary clock construction, and it was of those that you spoke, the main spring and main wheel were arranged back of the back plate, and the dial work in front of the front plate, what was there left to be arranged between the two plates joined by the pillars except the center wheels and the wheel or wheels carrying its power to the verge or crown wheel?

Ans. Ordinarily the main wheel is not arranged back of the back plate. That is a rare construction instead of an ordinary construction, and I do not recollect to have seen it in but two or three instances. It should not have been included under ordinary construction, but the main spring only should have been included as back of the back plate in ordinary constructions.

Cr. Int. 113. Consider it, then, as a rare construction, and being so, you ought to be able the more readily to describe it. Now, please tell me whether, in those instances where the main spring and main wheel were arranged back of the back plate, and the dial work in front of the front plate, the two plates being connected by pillars, what wheels were arranged between the two plates?

Ans. In answer I would state that that very construction in one case was accompanied with an additional wheel between the pillar plates, plates connected by pillars, and that the variety of wheels between these two plates is almost endlessly varied.

Cr. Int. 114. Now, in that one case to which you refer, name the wheels that were arranged between the two plates.

125 Ans. It was the peculiarity of the construction to which my

attention was called, and I cannot tell what wheels were arranged between the plates, but only recollect that there was an additional wheel to accommodate this construction.

Cr. Int. 115. An additional wheel to what?

Ans. An additional wheel to connect the train which grew out of this form of construction.

Cr. Int. 116. Where was it located?

Ans. It was located on the center shaft.

Cr. Int. 117. And between the plates, was it?

Ans. Yes.

Cr. Int. 118. So that there were three wheels between the center wheel and crown wheel, do you mean?

Ans. No.

Cr. Int. 119. How many were there?

Ans. I have already stated that my attention was not called to that part of the train.

Cr. Int. 120. You are certain that there were not three and also certain that there was one additional. There must have been more than three wheels, must there not?

Ans. Not necessarily.

Cr. Int. 121. Now, take these old constructions that you have referred to, in which there are two plates connected with pillars, the main spring and main wheel arranged back of the back plate, and the dial work arranged in front of the front plate, and place that movement so arranged in a clock case having a plate for a back, and attach the movement by posts or tongues or any like fastening to the plate forming the back, do you think that you would then have a clock movement arranged between three plates?

Ans. In answer I would state that I have already said that arranging the main wheel back of the back plate was not an old, but was rather an exceptional, construction, and that I had seen it only in two or three instances.

Cr. Int. 122. Without reference to the number of instances or the time when you saw them, please answer the question.

Ans. In answer to the question I would say that I must know what the defendants' counsel means by having a plate for a back.

126 Cr. Int. 123. Defendants' counsel shows to the witness the part of the clock case of the Hotchkiss clock which forms the back and bottom plate of that clock and is shown in Fig. 2 of the patent. I mean attach the movement that has been described to a similar plate which shall form the back of a clock case, and with that construction in view please answer the question.

Ans. In a clock movement having two plates, with the main wheel and main spring arranged back of the back plate, there is a perfect movement independently of any case into which the movement may be placed.

Cr. Int. 124. Now, attach such a movement to the plate forming the back of a clock case, as I have shown to you by the example of the Hotchkiss back-case plate; would that construction when so completed be a clock movement arranged between three plates?

Ans. If I correctly understand it, the case in which a clock is placed has nothing to do with the movement. This is certainly the case with the Hotchkiss clocks, and perfect watch movements are imported and sold independently of any case, and so watch movements in our own country are made and sold independently of any case in which they are placed, the buyers casing the movements in a way to suit themselves.

Cr. Int. 125. Then I am to understand it, as your opinion as an expert in clock mechanics, that if such a movement as I have supposed in my previous questions, and which you say would be a perfect movement independently of any case, should be placed in and attached to the back and bottom plate forming the back and bottom of the Hotchkiss clock case it would not be a clock movement arranged within three plates; is that so?

Ans. To call the back of a clock case a plate is to use words relating to clock and watches improperly, and sounds like the expressions used in the original patent.

I have already stated that a movement is to be considered as a thing perfectly independent of the particular case in which it may be placed.

Cr. Int. 126. In the Hotchkiss original patent how many different plates does the patentee refer to?

127 Ans. He refers to three plates, C, J, and K, as the plates in which the movement is arranged. He also refers to a rotating plate, which is another example of the loose way in which the original patent was drawn.

Cr. Int. 127. I also find in the original patent that the patentee speaks of the back of the clock case as a plate, and the bottom of the clock case as a plate, and also of a dial plate. Now why do you call the plate which is marked C as a plate in which the movement is arranged, in distinction from the other parts, not the pillar plates?

Ans. I call it so because the plate performs the functions of a plate, and is technically a plate, as we use that word in the art, as distinguished from the other plates referred to in the question.

Cr. Int. 128. What function of a plate does it perform?

Ans. The hub G passes through the back plate C and turns in the same and brings the plate within the technical meaning of the word plate as used in the art.

Cr. Int. 129. Do you mean because it affords a bearing for an arbor, which, I understand you to say, was the function of a plate?

Ans. If I have said the function of a plate was to support an arbor merely, I was mistaken. The functions of a plate are to support the rotating parts of a movement, and to confine it to supporting pivots or arbors would not be strictly correct; for example, the center arbor frequently passes through a brass socket and the socket rotates in the plate.

Cr. Int. 130. In your answer to cr. int. 65 you testified that "The word plate or plates as used in clock making are those parts in which the arbors turn in which the wheels and pinions are arranged." Is that so or not?

Ans. That answer was definite enough for a general answer.

Cr. Int. 131. Is or not that the function of a plate as you understand it—that is, to support the arbors?

Ans. I understand the functions of a plate to be to support the rotating parts of the clock or watch, but they may not support them all; bridges may also be employed to support some of them.

Cr: Int. 132. What rotating part of the Hotchkiss movement is supported by the plate C?

128 Ans. The hub and rotating disc carrying the planet wheel, the main spring being attached to the hub.

Cr. Int. 133. There is no arbor turning in it, is there?

Ans. The center arbor extends back and turns in this hub.

Cr. Int. 134. And this hub is attached to the rotating plate rigidly, isn't it?

Ans. I would state it right the other way; that the rotating disc is attached to the hub in which the center arbor turns, and thus both the hub and center arbor are supported by the back plate.

Cr. Int. 135. And the center arbor has its bearing in the rotating plate with its hub attachment, has it not?

Ans. No, it has not; the center arbor turns in the hub and not in the plate.

Cr. Int. 136. And the hub is a part of the rotating plate, isn't it?

Ans. No, the hub is not a part of the plate; they are two separate parts, and the plate is attached to the hub.

(Adjourned until Tuesday, February 27, 1883, at 10 a. m.)

Examination resumed.

NEW HAVEN, *Feb.* 27, 1883—10 a. m.

Present: Counsel as before.

Cr. Int. 137. In the specification of the reissued Hotchkiss patent, which you prepared, it is stated, "I am aware that the frames of movements have been made with three plates adapted to secure particular results." What were those results?

Ans. To describe all the particular results which arose from the use of three plates I should have to describe all the clocks that have had three plates, but to describe the particular results in a particular case I would refer to the Hubbell clock, which has been referred to in this case. I do not mean the clock marked Exhibit "Hubbell Movement," but I refer to the other one in evidence. In that case the particular result was to make more room for the main spring, so that a wider main

129 spring could be got in. In this connection I would remark that I do not agree with the defendants' expert when he says that the object of three plates in a frame is to shorten the arbors. To illustrate my meaning: In the Hubbell clock above referred to, if it were a thirty-hour clock, there would be no need, as I understand it, of separating to a greater distance from the front plate the lower back plate, in which the main arbor turns; so, too, if that clock were operated by a weight I think there would have been room enough if the lower back plate had been put in a plane with what

he calls the middle plate. The whole object in the use of these plates in this case was to get in a wider main spring, as distinguished from shortening the arbors as the object.

Cr. Int. 138. I infer from your testimony in this case that the arrangement of the parts of a clock movement within the clock frame is very various, differing with the different manufacturers of the clocks; is that so?

Ans. The wheels and pinions are differently arranged between the plates, but different manufacturers may manufacture the same clock in which is the same particular arrangement.

Cr. Int. 139. Can you give us an idea of the number of the various arrangements of clock movements, differing from each other in some respect, that you have fallen in with in your experience?

Ans. The number I have met with in my experience of clocks in which the several wheels and pinions which compose the train were differently arranged I could not state, for they are exceedingly numerous.

Cr. Int. 140. The great object, I understand, of the arrangement or division, as you call it, of the parts in the Hotchkiss clocks is to obtain a small clock; is that so?

Ans. The leading object of the Hotchkiss invention, as I understand it, was to make a movement that may be enclosed in a small and compact case.

Cr. Int. 141. And this is the sole object so far as what you call the division of the train is concerned, is it not?

Ans. I can't state what all the objects may have been, but I take it that the division of the train was made by the inventor as contributing to that end, in his judgment.

130 Cr. Int. 142. Are you familiar with the Exhibit "Davies' Patent?"

Ans. I have seen that patent. It was cited as a reference on the rejection by the examiner in the reissue application of Hotchkiss. It was cited by him as a movement that had three plates, and it has been referred to in the testimony in this case, if I am not mistaken, as having three plates. That movement only has two plates, and it was a great mistake to state that it has three plates.

Cr. Int. 143. Question repeated.

Ans. I am somewhat familiar with it.

Cr. Int. 144. Does the arrangement of the movements shown in that patent result in a small clock?

Ans. I understand by the arrangement of the movement, as used in the question, to be the parts of a movement, and I think that the arrangement of the parts of a movement in that clock contribute to that end. If I correctly remember, the inventor states that his object was to get in a long main spring, but I may be mistaken, as it is some time since I have examined the patent.

Cr. Int. 145. Please look at that patent, and say whether the patentee does not state, as a result of his combination of parts, that "gearing of a large size or coarse construction may be used in a clock of small dimensions?"

Ans. He does.

Cr. Int. 146. In that (Davies' construction) do you find certainly two plates, of which one is a pillar plate?

Ans. I do not notice that in this patent the expression pillar plate is used, and on an examination of the drawing there appears to be screws which pass into the pillars to hold the back plate. If this is correct, I take it that the front plate in this clock is the pillar plate, but I am not certain that such is the fact.

Cr. Int. 147. Question repeated.

Ans. In looking at the drawings, Fig. 1, screws appear to pass through the plate into the pillars, but I cannot say whether the front plate is rigidly attached or riveted to the pillars, so that it may be called a pillar plate. Both of the plates in this movement may be separated from the pillars, so far as I can judge from the drawing.

131 Cr. Int. 148. Do you find these two plates connected by pillars?

Ans. I do.

Cr. Int. 149. Do you find in that construction a main spring and main wheel arranged in the rear of those plates?

Ans. I do.

Cr. Int. 150. Do you find all the other wheels of the train, except the dial work, arranged between those two plates? If not, state what parts you do not find there.

Ans. The main wheel is arranged back of the back plate.

Cr. Int. 151. Into what does the main wheel mesh?

Ans. It meshes into a pinion.

Cr. Int. 152. Is that pinion back of the rear plate?

Ans. It is.

Cr. Int. 153. Now, are not all the other parts of the train, except the dial work, arranged between the two plates?

Ans. I believe they are, but as there is no vertical section of all the parts I may possibly be mistaken.

Cr. Int. 154. The main spring and main wheel are in the rear of and concentric with the movement between the plates, are they not?

Ans. The main spring and main wheel are in the rear of the rear plate and are concentric with the center shaft.

Cr. Int. 155. Does the center arbor, carrying the minute hand, in that construction extend through the two plates to the rear and through the back piece or plate, so that it can be turned from the rear of the clock?

Ans. The center shaft extends through the two plates and through the rotating disc D, that performs the function of a winding key, but the rotating disc D is loosely attached, if I understand that, to the socket to which the main wheel is attached, so that as the rotating disc D is turned on the socket, as the outer end of the main spring is attached to this piece, the clock is wound up.

Cr. Int. 156. Suppose what you call the rotating disc should be fixed and a pawl and ratchet attached to the hub and its wheel, as in the Exhibit "Hotchkiss Ratchet on Main Arbor," do you think the construction would be essentially altered?

Ans. In the question stated, if I understand it correctly, the

132 the outer end of the main spring would not be attached to anything. On reflection, it would be attached to the rotating disc just as it is now.

Cr. Int. 157. Suppose that to be so, would the construction of the clock, in your opinion, be essentially altered?

Ans. It would be, for the rotating disc D would not perform the function which it now does.

Cr. Int. 158. So far as the division or arrangement of the train is concerned, would that be changed in any particular by such alteration?

(Objected to, as it appears by the witness' last answer that the change already made would make the clock inoperative.)

Ans. By fastening the rotating disc D so that it could not be turned the clock could not be wound, but the several parts of the train would stand as they do now.

Cr. Int. 159. Why could not the clock be wound when the rotating disc was fixed if a pawl and ratchet arrangement was applied to the hub and main wheel as in the exhibit you have produced, marked "Hotchkiss Ratchet on Main Arbor?"

Ans. In the Davies clock, if the tubular arbor *d*, to which the inner end of the main spring is attached, were free to turn in the main wheel, and if a pawl and ratchet were interposed between them, the Davies clock could be wound, if the rotating disc was fixed, provided the said arbor *d* was so fixed or altered as to receive a key to rotate it, and in that case the rotating disc D, which, by the supposition, is made a fixed plate, would perform no function whatever, except to hold the outer end of the main spring, which could be held by a pin inserted in the back plate, if I correctly understand the construction of the Davies patent.

Cr. Int. 160. Now, suppose that you take out of the Davies clock his back piece D, with its connected main spring and wheel, and put in the place of it an ordinary main spring and wheel, arranged with proper adaptation and relation to the other parts as in the defendants' "Lane clock," do you think the Davies construction would be essentially altered?

Ans. If in the Davies clock the outer end of the main spring
133 were attached to a pin in the back plate, the inner end of the spring being attached to the arbor *d*, and this arbor was free to turn in the main wheel, and a pawl and ratchet were inserted between them, then we should have a main spring attached to a pin on the rear plate and attached to the arbor *d*, which is connected to the main wheel by a pawl and ratchet, and this being the construction, the rotating disc D would perform no function. Now, to change this construction and put it in the form in which the "Lane clock" is put would be a mere mechanical substitution, the pinion into which the main wheel meshes being arranged where the main wheel is as now constructed, but the clock by supposition is not a clock that we can compare and ascertain *as* with as much precision as if we had the clock before us.

Cr. Int. 161. In the case I have supposed, I intended that the sub-

stituted construction should have its parts fixed to a back piece, as in the "Lane clock." I wish you to so understand the question, and, so understanding it, say whether you wish to vary your answer to all?

Ans. If I correctly understand the question when the supposed changes have been actually made we should have the Hotchkiss clock, but I may not correctly understand it.

Cr. Int. 162. It would contain, would it not, so far as the division of the parts is concerned, all that is claimed in that respect for the Hotchkiss clock?

Ans. If the pinion into which the center wheel meshes in the Davies clock were brought down and arranged on the center shaft, as in the "Lane clock," and if the main arbor turned in the middle plate, as it is by supposition, and in a back plate, it would not then be the Hotchkiss movement quite, for the center arbor, if it was as long as it is now, would merely pass through a hole in the back plate, if I have got the construction right as supposed, but would come pretty near to the Hotchkiss clock.

Cr. Int. 163. I don't ask for any resemblances in any particular parts of the movement, but my question is confined simply to the division or arrangement of the trains. Now, would not the construction I have supposed contain substantially the division of train set forth in the Hotchkiss patent?

134 (Counsel for complainants requests the counsel for defendants to state whether the construction supposed is one which requires the Davies clock to be so changed as to place the center pinion and center wheel on opposite sides of a plate.

Counsel for defendants states that his question is clear and intelligible and the witness' answers show that he has understood it, and notwithstanding that the clew is now given to the witness for an answer he repeats the question and requires the answer of the witness to it.

Counsel for complainants assures counsel for defendants that the question was asked in good faith, and repeats it.)

Ans. In answer I would say that it is not easy to understand the supposed alterations by mere words, and that the supposed alterations may be easily shown in a sketch or drawing, and when they are so shown I will answer his questions, and until they are so shown such questions as the defendants' counsel has put only lead to confusion and mistakes. I must, therefore, respectfully decline to answer his questions relating to supposed alterations unless they are accompanied with a sketch or drawing, and this I believe to be treating the defendants' counsel very fairly.

Cr. Int. 164. Please look at the drawing, figure 1 of the Davies patent. Which of the wheels there represented do you call the center wheel?

Ans. I call the one that is next nearest the dial and between the plates.

Cr. Int. 165. And the center pinion is, as you understand, I suppose, the pinion along side of it; is that so?

Ans. The pinion in juxtaposition with the center wheel, I suppose.

Cr. Int. 166. Now, suppose you construct a plate intermediate of those two plates and in the plane between the center pinion and center wheel. Do you think there would be any patentable invention in such a construction?

135 Ans. In figure 1 in this patent there are only three wheels shown and two pinions. Just how the remainder of the wheels are arranged in this patent, the Davies, is not shown. With this particular form of construction, taking all the parts of this clock into consideration, perhaps there would be no invention, as it is quite likely in this particular clock no good and useful result would be secured by the introduction of a plate between the center wheel and center pinion of this clock.

Cr. Int. 167. Then whether a division at that particular point has any good and useful result depends upon what the parts of the train to be divided are, does it not?

Ans. No; I should say not. The parts of the train might be varied and still good and useful results might be obtained by dividing the parts at that place.

Cr. Int. 168. What good and useful result do you think is obtained in the defendants' clock by dividing the train at that point rather than any other?

Ans. It contributes to the end he had in view, viz., making a small and compact clock, and I would add that clocks have been made since the invention of Hotchkiss with frames having four plates, and that the train has been divided into three parts, the parts being arranged in the three compartments of the frame, the result being a still farther reduction.

Recess until 2 p. m.

Examination resumed, 2 p. m.

Cr. Int. 169. In your answer to int. 19 you say that the three exhibits, being the "Earle Models Five Wheel Train," Nos. 1, 2, and 3, "embrace the invention of Hotchkiss, and are pretty fair illustrations of the value of his invention," and "illustrates how easy it is to do a thing when you have been shown how." Did you mean by that statement to be understood that Mr. Hotchkiss anywhere shows in his patent how the trains exhibited by those models can be made?

Ans. In answer to the question I would say that the uppermost wheel, or center wheel as I would call it, which is held in the

136 models by a screw on the stud on which it is arranged, that between that wheel and the escape wheel in each of these models there are three wheels, and — illustrate or are the same construction as shown in the Hotchkiss patent, irrespective of the number of teeth in the wheels and leaves in the pinions which they may have.

Cr. Int. 170. Question is repeated.

Ans. He shows the three wheels in his movement put the same as the three wheels in this movement, and to just that extent the

Hotchkiss patent shows the same construction as these exhibits, only these are arranged on studs instead of being placed on arbors, which I regard as wholly immaterial.

Cr. Int. 171. I must repeat my question. Does the Hotchkiss patent show to Mr. Earle or any one else how trains in those exhibits can be made?

Ans. Mr. Hotchkiss' patent shows three wheels between the center wheel and escape wheel and illustrates how easy it is to put three wheels in this place in a train.

Cr. Int. 172. What difficulty is there or has there at any time been in putting three wheels in a train any more than any other number?

Ans. I will say that there was no difficulty, and that the invention consisted, not in overcoming difficulties, but in the application of what I believe to be a new principle in clock-making, to put three wheels in a particular place in a train for the purpose of reducing the space which they occupy and of securing large pinions and large pivots, while the number of leaves in the pinion were sufficiently numerous to make a good train; for example, not less than eight leaves in the pinions.

Cr. Int. 173. Hasn't it always been known to the clock-maker that he could reduce space by making his wheels smaller?

Ans. Yes.

Cr. Int. 174. Hasn't it always been known to the clock-maker that he can make the teeth of his wheels coarser by increasing the number of wheels—that is to say, with three wheels the teeth will be coarser than when two wheels with the same number of teeth are used?

Ans. In the Hotchkiss invention the object of putting three wheels in this place in the train was to secure compactness in
137 his clock movement and have large pinions and coarse teeth in this place in the train irrespective of the particular number of turns which they should make and high numbers in his pinions, and I do not recollect to have seen additional wheels being placed in a train and securing these results prior to the Hotchkiss invention.

Cr. Int. 175. Question repeated.

Ans. I have never seen the application of this principle carried out at this place in the train, if I understand the question.

Cr. Int. 176. Hasn't the clock-maker always known that if he put two wheels instead of one with the same number of teeth, as for instance, having one wheel of sixty-four teeth and he substitutes for it two wheels of thirty-two teeth each, that he will have the same result and the teeth of the two wheels will be coarser than the teeth of the one wheel?

Ans. If the two trains have teeth of the same coarseness the train with one wheel will occupy double the space of the train with two wheels.

Cr. Int. 177. Question repeated.

Ans. Not necessarily coarser.

Cr. Int. 178. Has he not always known that if he desired wheels

with coarser teeth that he could obtain them by substituting for one wheel of a given number of teeth two wheels each having half the number of teeth of the one wheel?

Ans. Such substitution will not always produce coarser teeth.

Cr. Int. 179. Might it not be made to produce them?

Ans. The two wheels might either be coarser or finer, but if they had teeth of the same coarseness of the one wheel then they would occupy one-half the space of the one wheel.

Cr. Int. 180. Isn't it common with clock-makers to make a second pendulum with one wheel between the center and crown?

Ans. You find such constructions in the old clocks, I believe.

Cr. Int. 181. Isn't it customary to make shorter rod clocks that beat half or quarter seconds with two wheels between the center and crown?

Ans. It is customary, I think, to make pendulums beat
138 seconds, one-half seconds, and three-quarter seconds, but the pendulums do not always beat in just those times, but may vary from those fractions, and it is customary to do it with two wheels.

Cr. Int. 182. And are not those two wheels put there to get small wheels and coarse teeth?

Ans. When we put those two wheels there instead of one and have the same fineness in both that there is in the one, one would occupy double the space of both; the length of pendulum being the same, the coarseness of teeth hasn't anything to do with it, necessarily, with putting two wheels in this place in the train.

Cr. Int. 183. Now, when Hotchkiss knew what pendulum his small case would accommodate he knew what beats he could have for his movement, didn't he?

Ans. When Hotchkiss had determined on the length of his pendulum and the number of teeth in his escape wheel he knew the number of turns, or could easily find it, that would be required of the escape wheel.

Cr. Int. 184. Do you say that he — required to know the number of teeth in his escape wheel in order to know what beats his pendulum would give?

Ans. The number of teeth in his escape wheel had nothing to do with the vibrations his pendulum would make; that would depend on the length of the pendulum.

Cr. Int. 185. Now, we'll suppose that he had got his pendulum rod and all his movement except the wheels between the center and escape wheels; he would know, would he not, what space there would be left for that train of wheels between the center and escape wheels?

Ans. The space would be unlimited, if I understand the question correctly.

Cr. Int. 186. It would be limited on one side by the center wheel and on the other by the escape wheel, wouldn't it?

Ans. Those would be the limitations, without regard to the distance that they were apart.

Cr. Int. 187. I have supposed that he has his case and from that has determined upon his pendulum and has arranged all the

139 movement, except the train from the center shaft to the crown; now, he would know how much space he would have for that train to occupy?

Ans. Yes.

Cr. Int. 188. Having that space I will suppose that he wishes to put in these three small wheels which that space will accommodate. Now, we have seen that he has obtained the number of beats for his pendulum by its length, and we will assume that he takes any desired number for the teeth of his escape wheel and for the leaves of his pinion upon the three wheels. I will ask you as one who has had a life-long familiarity with Reid's Treatise, if it isn't a simple matter by arithmetic for him to construct those wheels for the purpose of making that train and to bring out as the result of that figuring the very train which he describes in his patent?

Ans. The answer is, No; he may put all his arithmetic with two wheels in that place in a train or three; that arithmetic has nothing to do with the number of wheels in a train.

Cr. Int. 189. Please look at Reid's Treatise, on page 14, and explain, if you can, why the rule which he there gives for determining the numbers for the wheel teeth of any clock movement will not enable the clock mechanic to put into his train any number of wheels that he may desire to be accommodated to any given space, and if upon the data which I have given in my last question you can by following that rule bring out any other result than that which Hotchkiss gives for his three-wheel train in his patent I wish you would do so.

(Adjourned until Wednesday, Feb., 28, 1883, at 10 a. m.)

NEW HAVEN, *Feb.* 28, 1883—10 o'clock a. m.

Present: Counsel as before.

Witness states in reply to cr. int. 189 as follows:

Ans. Reid's Treatise on clock-making has been before the
140 public for half a century, and is a well-known and reliable work. But we do not find any tables in it that I can discover that give the number of wheels that shall be placed in a train, or in any particular place in a train, but we do find tables like the following:

"To find the number of vibrations in a minute, or in an hour, having the number of the wheel teeth and of the pinion leaves, and also to find numbers for the wheel teeth, having assumed numbers for the pinions, for the swing or balance wheel, and the number of vibrations required in an hour," etc., etc.

Reid's preface to the rule referred to is as follows:

"In order to be certain what the numbers for the wheel teeth of a clock or watch movement should be, three things are requisite to be known or fixed upon: first, the number of beats to be given in a minute or an hour; second, the number of the pinions and of their leaves, and, third, the number of teeth it is intended for the swing or balance wheel to have."

It will be noticed that the rule is for finding the number of teeth in the wheels, and not for finding the number of wheels in

the train—two things which are very distinct. I would add that the rule is not applicable to finding the number of wheels in a train, and I would also add that the number of pinions, with their leaves, must be "fixed upon," and be assumed, and of course the number of wheels before the rule can be applied to the number of teeth to be cut in the wheels in any case. When we "fix upon" and assume the number which Hotchkiss has invented, then we "fix upon" any assume the Hotchkiss invention for the purpose of the calculation.

In answering the first part of the question ending with the words "any given space," I would say that understanding the words "any given space" to mean the space between the center wheel and the escape-wheel arbor, and understanding the words "any number of wheels" to mean "any number of wheels" irrespective of the number of pinions, as the question seems to imply, the answer is, "No." The explanation is, that if the number of wheels is less than the number of pinions on arbors, or if greater than the number of pinions, there would be no train connection. In answer to the second question, it will be seen that by comparing the data required
141 by cr. interrogatory 188, with the preface above quoted, that the data are not sufficient with which to make the calculation by the rule referred to. The following is a quotation from page 14 of Reid's Treatise:

"It might happen that the number of vibrations required, and the number of the wheel teeth and of the pinion leaves may be so incommensurate that the quotient obtained, besides being a whole number, may have some decimal parts annexed to it, which would in this case be improper, and could not be used."

The Hotchkiss train, if I understand it correctly, is one of this kind.

Redirect examination by Mr. MITCHEL:

R. D. Int. 190. Your attention has been called to the Davies patent, and to the fact that that invention, like that of Hotchkiss, was dictated somewhat by a desire to economize space. Suppose a Davies clock to be made, having a main wheel of the size and number of teeth contained in the Lane clock, or in the rack of the Hotchkiss clock, what would be the size of the Davies clock relatively to the plaintiffs' and defendants' clocks, and why?

Ans. The main wheel would in that case occupy a space nearly commensurate with the rack and the first wheel, or next wheel above the main wheel, would have to be large enough to mesh with the center pinion. This would enlarge the movement by half the diameter of the second wheel, and then the center wheel, being in the center of the case, it would make the clock larger by the diameter of the wheel, which would be to make an average size clock of it.

R. D. Int. 191. Have you seen the Davies clock, as sold in the market; if so, what is the size, as compared with plaintiffs' and defendants' clocks?

Ans. I shall have to answer that question from recollection—that I believe it to be larger.

R. D. Int. 192. How many pivot holes for the train are shown in the plates of the frame of the Hotchkiss clock in Figs. 5 and 6 of the original patent?

142 Ans. In Fig. 5 there are six shown; and in Fig. 6 six are also shown in the pillar plate, and three are shown in what we generally call the top plate.

R. D. Int. 193. Why are no more shown in the top plate of Fig. 6?

Ans. The drawing is a perspective drawing, and some of the pivot holes in the top plate, as we call it, are hidden by the pillar plate.

R. D. Int. 194. What kind of a drawing is Fig. 1 with reference to its being a perspective or otherwise?

Ans. It is a perspective drawing.

R. D. Int. 195. What bearing has that fact upon its character as a representative of the whole invention of Hotchkiss?

Ans. I don't see that it has any. In making drawings for machines we commonly make the first figure to show the outline or general appearance of the machine and make other figures to show the construction, and as many of them as is necessary to show the construction.

R. D. Int. 196. Well, do you understand that Fig. 1 is a defective drawing, intended to represent a clock having the same train as that for which the parts shown in Figs. 5 and 6 are intended?

Ans. Certainly it was intended to show the same trains that Figs. 5 and 6 show, because it is the same clock, and is defective in that it might have shown as many pivot holes as Figs. 5 and 6 show, so far as they come into view.

R. D. [Int.] 197. In reply to cr. int. 45 you say that it was not understood by you that it was desired to obtain a reissue to stop defendants' manufacture at the time when you applied for the reissue now in suit. Please explain a little more fully why you say that that was not the understanding.

Ans. Hotchkiss showed me his first reissue and desired me to look it over, and I did so, and I thought it was the worst drawn patent that ever came from the Patent Office, and that it was utterly worthless and void, for in the claims were found parts which are not shown or described in the patent. If the first reissue had been in my judgment a good patent the Lane clock would have been a direct infringement of it.

143 R. D. Int. 198. Referring again to the Davies clock, does it contain any pinion behind a center plate?

Ans. There is no center plate in the clock, and there is a pinion behind the back plate.

R. D. Int. 199. In the Davies clock is there any center wheel and center pinion on opposite sides of any intermediate plate whatever?

Ans. In the Davies clock there are only two plates and the center wheel and center pinion are between the plates. This answer means no.

R. D. Int. 200. In the Davies clock do you find any center shaft passing through any plate with center wheel and center pinion mounted upon it, on opposite sides of that plate?

Ans. No.

R. D. Int. 201. Does Defendants' Exhibit "Enlarged Hotchkiss Train" show the back plate of the Hotchkiss three-plate movement?

Ans. It does not.

R. D. Int. 202. In what sense do you say, in reply to cr. int. 75, that the pawl and ratchet is no part of the Hotchkiss train?

Ans. The train consists of the wheels and pinions in a clock, and the pawl and ratchet don't come under that denomination.

R. D. Int. 203. Is there any sense in which a pawl and ratchet may be claimed to be essential in the Hotchkiss train which does not apply to the train in the Lane clock?

Ans. No; somewhere or other there must be a pawl and ratchet for the purpose of winding.

R. D. Int. 204. How soon after Hotchkiss obtained his first reissue did he consult you about its validity and the question whether or not it should be reissued?

Ans. I can't state the exact time, but at the time that he consulted me about his first reissue he supposed it was a good and valid patent, and there was nothing said about a reissue until I advised him that his patent, in my judgment, was worthless.

R. D. Int. 205. Well, about how long was it after he obtained his first reissue?

Ans. I should say it was within a week or ten days.

R. D. Int. 206. State whether or not you began to prepare
144 an application for a reissue forthwith, and whether or not there was any special cause of delay.

Ans. I soon commenced preparing the reissue papers, and when the papers were ready for the signature of Mr. Hotchkiss I notified him, and he came and made oath to the invention and signed the papers. I told him we must have the patent which he had first reissued, and surrender it to the Commissioner of Patents, and he couldn't find his patent, and his application papers lay in my drawer for a long time, and, as he could not find his patent, he made affidavit that he had lost it, which was sent to the Commissioner of Patents.

R. D. Int. 207. Say whether or not the application was sent right away after he gave up the search for the original patent and made the affidavit.

Ans. It was.

R. D. Int. 208. Please quote from the patent the language which to you indicates that the means of connection of the parts of the train on the opposite sides of the middle plate are the center shaft carrying its wheel and pinion.

Ans. "The two parts being connected by the center arbor H."

R. D. Int. 209. Suppose the Hotchkiss train were to be disconnected by removing the instrumentality which establishes the connection between the portions of the train on opposite sides of the middle plate, what part would in such case be removed?

Ans. The center arbor.

R. D. Int. 210. Say whether or not the removal of the same part in the Lane clock would create the same disconnection.

Ans. It would.

R. D. Int. 211. In your opinion is it material that every one of the arbors in that portion of the train forward of the center wheel should have its rear pivot in the middle plate in order to be within some of the claims of the Hotchkiss patent?

Ans. It is not.

145 Recross-examination by Mr. INGERSOLL:

R. Cr. Int. 212. If Fig. 1, in the drawings of the original Hotchkiss patent, was made, as you say, drawings to "show the outline or general appearance of the machine *are* commonly made, why did you cause it to be altered, as it appears to be in the reissued patent?

Ans. It will be noticed in looking at the original patent that it is turned so that the side of the movement is shown almost as much as the front of the movement, and that in the reissue the view approximates a front view, and shows the outline of the parts and movement much better, and I will add, according to my idea of things, it is a much better view.

R. Cr. Int. 213. Do you mean to say that you think there are any three wheels shown, or intended to be shown, in Fig. 1 of the drawings of the original patent?

Ans. They certainly are not shown, but what the intention was is more than I can tell, for I had nothing to do with it.

R. Cr. Int. 214. You say that the removal of the center arbor from the Hotchkiss train and also from the Lane train would disconnect in either case the train; would that not be so with any clock train from which the center arbor should be taken?

Ans. In talking about clocks and watches we use language a little loosely sometimes. By a train connection I understand that the teeth in the wheels mesh in the pinions, and that there is no way of disconnecting a train properly but by removing a wheel, so that it will not mesh in its pinion. In taking out the center arbor any clock would be completely disabled.

R. Cr. Int. 215. And so the Hitchkiss clock would be disabled if you took away the center arbor?

Ans. Yes.

R. Cr. Int. 216. Suppose you remove the pawl and ratchet from between the center wheel and center pinion of the Hotchkiss train, would or not such removal disable the train?

Ans. If there was nothing more done it would.

R. Cr. Int. 217. And so in the same case it would disconnect the train?

146 Ans. Not in the sense in which I have used it, for the train connection would be just as perfect as it is now, and by simply transferring the ratchet to the position shown in exhibit marked "Hotchkiss Ratchet on Main Arbor," and securing the center wheel and center pinion to the center shaft, the construction as between the center wheel and center pinion would be the same in both clocks—*i. e.*, the Lane and Hotchkiss clocks.

Redirect examination by Mr. MITCHELL:

R. D. Int. 218. Would the removal of the pawl and ratchet in the

Hotchkiss clock render the train inoperative any more than the removal of the pawl and ratchet in the Lane clock would render it inoperative?

Ans. No; a pawl and ratchet is essential to movements and the place where it is put belongs to the details of construction.

R. D. Int. 219. Admitting that the removal of the center shaft in any clock would disconnect or disable the train, is it true that in any other clock than the Lane and Hotchkiss the removal of the center shaft would so disconnect the train as to leave the separated portions on opposite sides of a division plate?

Ans. I have seen no such clock.

R. D. Int. 220. As a person experienced in making drawings and soliciting patents, have you any doubt that figure 1 was intended to represent the same clock with the same train that is found in the Patent Office model and is disclosed in portions in the other drawings of the patent?

Ans. I have not; but I think that figure 1 in the original patent is pretty much like all the rest of it, and that in the original patent the drawings were poorly made and the specifications poorly drawn.

R. D. Int. 221. What acquaintance have you had with clock making and the art appertaining thereto?

Ans. My father was a clock and watch maker; I worked for him during my minority, or until I was about 19 years of age, somewhere thereabouts, and at intervals afterwards, and learned the trade with him, and from that day to this I have been conversant with clocks and watches, to a greater or less extent.

147 Recross-examination by Mr. INGERSOLL:

R. Cr. Int. 222. Is it not true that in the Davies clock if the center shaft is removed there will be left on one side of the division plate (which would be the rear plate of the two plates connected by pillars) all the parts of the train back of and including the pinion into which the main wheel meshes, and upon the other side of such division plate there would be left all the other parts of the train, and these two parts would be disconnected and the clock disabled just as much as in the case of the removal of the center shaft from the Hotchkiss clock, which is supposed in R. D. int. 219.

Ans. In the Davies clock, back of the back plate, the main wheel don't turn on the center shaft, but is attached to a socket which turns on a socket, and the removal of the center shaft would not disable that part of the train back of the back plate, but would disable the clock.

GEORGE TERRY.

Attest: JOHN B. MILLS, *N. P.*

Hearing adjourned until Tuesday, March 6th, 1882, at 10 o'clock a. m.

JOHN B. MILLS, *N. P.*

Deposition of Hiram C. Thompson.

Direct examination by CHARLES E. MITCHELL, Esq., of counsel for complainants:

Interrogatory 1. What is your name, age, residence, and occupation?

Answer. Hiram C. Thompson; age, 52; residence, Bristol, Connecticut; occupation, clock-maker.

Int. 2. How long have you been engaged in clock manufacturing?

148 Ans. I have been manufacturing, on my own hook, four years last November; previous to that I was foreman in Mr. Noah Pomeroy's clock shop for fifteen years, about, and I succeeded to his business.

Int. 3. Please look at Complainants' Exhibit "Defendants' Clock" and say how long it would take a clock manufacturer having all the usual facilities for clock making, but with no tools or apparatus special to this clock, to fit up tools and apparatus so as to be prepared to furnish it as ordered in the market.

Ans. From what I know of getting up new clocks, in my judgment, it would take from one to two years.

Int. 4. Have you had experience in getting up new clocks?

Ans. I have.

Cross-examination by C. R. INGERSOLL, Esq., of counsel for defendants:

Cr. Int 5. What parts do you find in that clock which would require tools not common to every clock-maker?

Ans. In the first place the wheels are very much smaller than in common clocks, and the frame is in separate pieces, more than common clocks. I should think it would require nearly double the dies and punches to make that frame over a common clock. I don't know as there is anything else.

Cr. Int. 6. Take the wheels; can they not all be made with one die except the main wheel?

Ans. Those wheels have the appearance of having been made with the same die, except the center. I can't tell whether they are precisely the same size without calipering them.

Cr. Int. 7. How long would it take to get up a single die to make the wheels except the center and main?

Ans. If you mean to make the wheels at one stroke with the double die, my judgment is it might take ten days.

Cr. Int. 8. How long to make the die for the main wheel?

Ans. About the same time.

Cr. Int. 9. And the center wheel?

Ans. The center wheel is not spoked; it ought not to take as long to make that.

149 Cr. Int. 10. Now take the frame. How are the parts of the frame made—that is, by what tools?

Ans. Blanked out with a die and punch.

Cr. Int. 11. How many dies and punches would be required to blank out the frame? Take each part of the frame which requires a special die by itself.

Ans. For blanking out these frames you would want three dies, and for gutting this triangular frame here, the front one—that is a difficult question to answer. You can gut the frame and punch all these holes at once. It needs a die for these pillars—what takes the place of pillars—the parts connecting the three frames together. These pin-holes can be punched or drilled, — not essential either way.

Cr. Int. 12. Go on and state what dies, special to the manufacture of the clock in question, are required besides the blanking-out dies for the frames and for gutting and punching the front one and for making the pillars?

Ans. You would need a punch-box for the back and middle frame to punch the pivot and pillar holes. You would need two dies and punches for the buttons in which the verge-shaft hangs; don't see anything else, unless it be this pendulum, which would require a special tool. You might have a round die just the size of this pendulum in the shop, and you might not. It would take a die to make this pendulum ball. It would take one die for the press besides the blanking die and one die for either drop or press to form it up.

Cr. Int. 13. How long would it take to make the three dies for blanking out the frames?

Ans. Well, fifteen days, perhaps.

Cr. Int. 14. If only two were to be made how long would it take?

Ans. In the same ratio.

Cr. Int. 15. How long would it take to make the die to gut and punch the triangular front frame?

Ans. It is a hard question, because it is a complicated thing to make if you make it in that way. I would put it twenty days.

Cr. Int. 16. How long for the die for the pillars?

Ans. Five days.

Cr. Int. 17. How long for the punch-box to punch the pivot and pillar holes?

150 Ans. I would say three, if it includes the pivot holes for the train; twenty days, same as the other; if it doesn't include that, not more than half that time.

Cr. Int. 18. How long would be required for such dies as might be needed for the pendulum ball?

Ans. Ten days.

Redirect examination by Mr. MITCHELL:

R. D. Int. 19. I suppose it would take some time to prepare tools for making the verge, would it not.

Ans. Yes.

R. D. Int. 20. It would require some time, would it not, to prepare tools for making the pendulum rod?

Ans. Yes; it would take some time.

R. D. Int. 21. Is the same true of the case?

Ans. Yes, sir.

R. D. Int. 22. How about the dial and hands?

Ans. I shouldn't be competent to judge about that, as it is not part of my business.

R. D. Int. 23. Please look at the wheel on the back of the dial, which constitutes part of the dial work, and say whether any special dies would be needed to make that.

Ans. There would. It seems to be larger than the others.

R. D. Int. 24. In getting up a new clock to what is the principal consumption of time due?

Ans. It is due to rightly arranging the parts; getting the relative sizes of wheels and pinions and cutting wheels correctly.

R. D. Int. 25. State whether or not time is consumed in fixing over and altering tools which were theoretically satisfactory, but which were found upon trial to need to be altered or made over.

Ans. Yes; quite a good deal of time.

R. D. Int. 26. Are gauges necessary in making such a clock; and, if so, how many special gauges for making the defendants' clock?

Ans. One for the size of each wheel, one for the length of each pinion, center shaft, and ratchet, one for the size of each pinion socket, one for the length of the socket, for the size of the pivots.

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R. D. Int. 27. Have you had any special experience in getting a small clock out, which enables you to speak from experience?

Ans. I have.

R. D. Int. 28. State it.

Ans. I got up a clock—a one-day lever alarm—which was new throughout, not patterned after any one else. I was over a year and a half bringing it to perfection, so as to put it into the market.

Recross-examination by Mr. INGERSOLL:

R. Cr. Int. 29. What was this last clock referred to?

Ans. It was called the "Cavalier," and it was put on the market two years ago, I think.

R. Cr. Int. 30. How long would it take to prepare the tools for making the verge in the clocks you have testified about?

Ans. I shall have to speak a little indefinitely about that, for I am not a verge-maker. Takes ten days.

R. Cr. Int. 31. And as to the case?

Ans. Shouldn't like to testify about that; I don't know anything about it; I am not a case-maker.

R. Cr. Int. 32. And these gauges that you have mentioned, what are they made of and how long would it take to make them?

Ans. Sheet steel—so much time consumed in the adjusting and fussing—say six days.

Redirect examination by Mr. MITCHELL:

R. D. Int. 33. Is it possible to judge of the time which it would practically take to get a new clock ready for the market by getting the aggregate of the periods which ought to be consumed in making the several tools employed?

Ans. Not to judge very closely.

152 Recross examination by Mr. INGERSOLL:

R. Cr. Int. 34. And, I suppose, in a good clock shop several men might be employed on these different parts at the same time?

Ans. They might be.

R. Cr. Int. 35. And would they not be so ordinarily made, either in the shop of a manufacturer or by contract outside?

Ans. I think not, sir.

H. C. THOMPSON.

Attest: JOHN B. MILLS, *Notary Public.*

153 United States Circuit Court, District of Connecticut. In Equity.

THE PARKER & WHIPPLE CO. *et al.*

vs.

THE YALE CLOCK CO. *et al.*

I, John B. Mills, notary public, by consent of parties examiner in the above-entitled cause, do certify that the foregoing depositions were taken before me on the days in the body of the said depositions named, to be used on the part of the complainants in the above-entitled suit; that said depositions were reduced to writing by me in the presence of and from the statements of the witnesses who subscribed said depositions and in the presence of the counsel for the respective parties.

That the witnesses were duly cautioned and sworn and subscribed the said depositions before me.

That I am not of counsel or attorney for either of the parties in said depositions and caption named, or in any way interested in the event of said cause named in said caption.

In testimony whereof I have hereunto set my hand and seal this 7th day of March, 1883.

[SEAL.] JOHN B. MILLS,
Notary Public.

154 United States Circuit Court, District of Connecticut. In Equity.

THE PARKER & WHIPPLE COMPANY *et al.*

vs.

THE YALE CLOCK COMPANY *et als.*

Evidence for defendant taken under and pursuant to the 67th rule of the Supreme Court of the United States in equity, as amended, before Francis G. Ingersoll, notary public for the State of Connecticut, pursuant to notice and by consent of parties.

179 CHURCH STREET, ROOM 8,
NEW HAVEN, CONN.,
WEDNESDAY, *December 27th*, 1882—10 o'clock a. m.

Present: John S. Beach and Charles E. Mitchell, Esqrs., of counsel for complainants, and Charles R. Ingersoll and S. Harrison Wagner, Esqrs., of counsel for defendants.

155 FREDERICK A. LANE, a witness produced by and on behalf of the defendant, being duly cautioned and sworn, to questions proposed by C. R. INGERSOLL, Esq., of counsel for defendant, answered as follows:

1st Int. What is your name, age, residence, and occupation?

Ans. Frederick A. Lane; 33 years old; New Haven, Conn.; clock-maker.

2d Int. Do you hold any position in the defendant's company; if so, what?

Ans. I am secretary of the company.

3d Int. Have you any connection with their factory; if so, what?

Ans. Their superintendent.

4th Int. How long have you been such superintendent?

Ans. Since the foundation of the company—1879.

5th Int. Before that, what had you had to do as a clock-maker?

Ans. I was contractor at the New Haven Clock Shop for twelve years.

6th Int. With what branches of clock-making did that employment make you familiar?

Ans. With all branches pertaining to the movements.

7th Int. Before your employment by the New Haven Clock Co., had you had any experience in clock-making; if so, what?

Ans. I had; was in the employ of E. N. Welch Manufacturing Company, of Forestville, Conn., for four or five years.

8th Int. Before the formation of the defendant company had you taken out any patents for inventions in clock manufacture; if so, how many?

Ans. I had taken out two.

156 9th Int. For what purpose was the Yale Clock Company formed?

Ans. For the purpose of making clocks and clock movements and using these patents in their manufacture.

10th Int. When did it commence business?

Ans. I think in December, 1879.

11th Int. Upon what kinds of clocks did it commence with its manufacture?

Ans. Small pendulum clocks.

12th Int. By what name known?

Ans. One was known as "Yale No. 1;" another was known as "Grandfather."

13th Int. Did you know, at the time of its execution, of the contract in evidence as the "Yale Agreement" Exhibit?

Ans. I did.

14th Int. Did the defendant company proceed to make clocks for the Parker & Whipple Company under that agreement; if so, when did they commence such manufacture?

Ans. They did commence as soon as possible and made the first delivery in June, 1880.

15th Int. What parts of such clocks were made under that contract by the Yale Clock Company?

Ans. The frames and wheels were pressed and cut and assembled

with the parts furnished by them. The contract shows what was furnished by them.

16th Int. In clock making does each kind of clock movements require for its manufacture a special set of tools?

Ans. It does.

17th Int. Was this so in the case of the clock movements
157 to be used in the clock which was the subject of the contracts with the Parker & Whipple Co.?

Ans. It was.

18th Int. Who got up the tools for that manufacture?

Ans. The set of tools used were gotten up by the Yale Clock Company at Parker & Whipple's expense. The set of tools furnished by Parker & Whipple were imperfect and inadequate to do the work, and new ones were built in their stead.

19th Int. What were the tools so provided?

Ans. They were twenty two or three dies and punches for stamping and bending the different parts.

20th Int. How long did you work under the contract with the Parker & Whipple Company?

Ans. We finished the contract, which expired Nov. 1st, 1880.

21st Int. Do you mean that your work for them stopped Nov. 1st, 1880?

Ans. I do not. I mean that that contract expired at that time, but it was verbally renewed from month to month until about Jan. 1st, 1881.

22d Int. Was what you call a renewal of the contract made upon the same terms in respect of price to be paid you for the work as provided in the original written agreement?

Ans. It was not.

23d Int. What was the new price—greater or less than the other?

Ans. The price was increased two and a half cents a clock.

24th Int. When you stopped work upon that clock had you any on hand, and also about how many?

Ans. We had; about three thousand.

158 25th Int. What was done with those clocks?

Ans. They were shipped to Parker & Whipple.

26th Int. What was done with the tools to which you have referred as made for that manufacture?

Ans. They were also shipped to Parker & Whipple.

27th Int. Were the clocks made by you under this contract with the Parker & Whipple Co. in any respect guaranteed by you?

Ans. There was a circular placed in each box stating that the clocks were made by us for Parker & Whipple Co. and warranted to be good time keepers; that's the substance of it.

28th Int. Had the clocks made by your company under this agreement with the Parker & Whipple Co. any imperfections resulting from their construction which interfered with their commercial success? And, if so, state in what respect they existed.

Ans. They had. The parts of the clock that made up the motive power connected with the internal gear were complicated and impractical to make profitably.

Defendants' counsel offers in evidence U. S. letters patent No. 237,028, dated Jan. 25th, 1881, granted to Frederick A. Lane, of New Haven, Conn., and it is marked "Defendant's Exhibit Lane Patent," and it is agreed that a Patent Office copy may be substituted for the orignal.

29th Int. Are you the Frederick A. Lane to whom the letters patent just put in evidence were granted?

Ans. I am.

159 30th Int. When did you make the invention which is the subject of the letters patent?

Ans. I can't state the exact date, but some time between the twelfth and eighteenth of October, 1880.

31st Int. Are the imperfections to which you have alluded as existing in the Parker & Whipple clock removed by that invention?

Ans. They are entirely so.

32d Int. In what way?

Ans. By employing the main wheel common to all common clocks in place of the complicated mechanism of the internal gear of the Parker & Whipple clock.

33d Int. Has the Yale Clock Company manufactured clocks according to your patent since the grant of that patent?

Ans. They have.

34th Int. When did the Yale Clock Company commence their manufacture?

Ans. January 3d, 1881.

35th Int. Did they manufacture the clock before January, 1881?

Ans. They did not.

36th Int. It has been testified by a witness, Roys, that the company manufactured about a hundred, more or less, of those clocks before January 1st, 1881; is that so?

Ans. It is not.

37th Int. By whom were the tools used by the defendant company in the manufacture of the Lane clocks made?

Ans. We employed the same party to make our tools that we employed to make the tools for the Parker & Whipple clock—

160 George Griswold, in Atwater's Block, corner of St. John and Artisan streets, New Haven, Conn.

38th Int. When did they make the tools?

Ans. They commenced making the tools for the gear of my clock within two or three days—I can't state positively without referring to the books—from the time applied for the patent, Oct. 18th, 1880.

39th Int. In your preparations for the manufacture was there any secrecy employed?

Ans. None whatever. The machine-shop where the tools were made was open to the public, and some person or persons connected with the Parker & Whipple Company were in and out of the shop two or three times a week.

40th Int. Comparing the Parker & Whipple clock with the clock made under your patent, do they differ; and, if so, to what extent in respect to the number of parts employed in their making up?

Ans. The Parker & Whipple movement has ten or twelve more parts than my movement.

41st Int. How many parts in all has the Parker & Whipple movement?

Ans. Between thirty and forty.

42d Int. Could any of the parts in your movement be made by the tools employed to make the parts of the movement employed in the Parker & Whipple clock; if so, how many of such parts? I mean by tools such as you have heretofore referred to—dies and punches.

Ans. I can only call to mind two dies and punches, and
161 they are common to the manufacture of clocks—wheel die and the pendulum nut die.

43d Int. When you applied for your patent for the clock known as the "Gem," did you know that a patent had been granted to Mr. A. E. Hotchkiss, under which the Parker & Whipple clock was made?

Ans. I did, and obtained copies of the patent from Washington.

44th Int. Did you make yourself familiar with claims of invention therein made by the patents?

Ans. I did; I employed a patent attorney to carefully examine each claim and compare my clock with them.

45th Int. Did you believe, as the result of this examination of the Hotchkiss patent, when you applied for your patent, that there was nothing in the invention for which the application was made which had been secured prior thereto to Mr. Hotchkiss or any one else?

Objected to as leading.

Ans. I did; I was positive.

46th Int. In fact, was there anything claimed as the invention of Mr. Hotchkiss in the patent which he had then taken out which you employed in making the clock according to your patent, as you have testified?

Objected to as involving the construction of the claims.

Ans. There was nothing that we could discover by careful examination.

47th Int. How many clocks, according to your patent, did the defendant company send into market in Jan., 1881?

162 Ans. Between two and three thousand.

48th Int. Do you know whether any person of the Parker & Whipple Company knew of your manufacture of that clock before the twenty-second of January, 1881?

Objected to as immaterial.

Ans. I do.

49th Int. Who, and when?

Ans. Mr. T. F. Breese, the treasurer of the complainant Co. I gave him one at his request during the first week in Jan., 1881, and a day or two after that he got another from me.

50th Int. From the twenty-second of Jan., 1881, which I under-

stand to be the time of application for the first reissue of the Hotchkiss patent, to the 14th of March, 1882, did the defendant company continue to make and sell clocks according to your patent; and, if so, were those sales in considerable number, and did they or not increase during that period?

Ans. They did make the clocks under that patent, and the sales were such that the company were unable to manufacture fast enough to fill their orders.

The witness here states that he desires to correct his ans. to the 47th int. Instead of "between two and three thousand," he wishes it to be about 1,200.

Cross-examination by Mr. MITCHELL:

51st X Int. Down to the time when the Yale Company began to make the Hotchkiss clock had they manufactured and sold
163 any clocks excepting Yale No. 1 and that known as "Grandfather?"

Ans. These two clocks were the only ones the company had had time since their foundation to get into shape to manufacture, although they had dies and punches and tools for eight or ten other varieties of clock movements of different sizes.

52d X Int. Describe "Yale No. 1" as to size.

Ans. The clock, as it was then set up, was about—I can't say exactly, but from seven to nine inches high, and the width of it in proportion.

53d X Int. Give the dimensions of the "Grandfather clock."

Ans. The "Grandfather clock" stood about seventeen inches high, had the same sized movements as the "Yale No. 1," the parts being held between the same plates as the Yale 1—*i. e.*, plates made by the same tools; you might substitute frames for plates; it would be understood better; all the difference existing between these two movements was different numbers of teeth in the wheels and pinions above the center shaft.

54th X Int. Since you refer to the movements of these clocks of your manufacture, will you furnish one to be marked in connection with your deposition?

Ans. I will.

55th X Int. Has the Yale Company up to this date marketed any of those eight or ten other varieties for which they had dies and punches, as stated in your answer to the 51st X int?

Ans. The company have not seen fit to manufacture any of those varieties.

56th X Int. At what time in June, 1880, was the first delivery of clocks under the "Yale agreement?"
164 Ans. The 17th.

57th X Int. How many clocks were included in this first delivery?

Ans. About three and one-half dozen.

58th X Int. How many Hotchkiss or Little Jewel clocks were

manufactured by the Yale Clock Company for the plaintiff between the seventeenth of June, 1880, and the termination of the delivery of clocks about the first of January following?

Ans. Between forty-seven and forty-eight thousand.

59th X Int. Was each of these clocks placed in a separate box by the Yale Company?

Ans. They were.

60th X Int. And each of these forty-seven or forty-eight thousand boxes contained, if I understand you, a Hotchkiss or Little Jewel clock, together with a circular in which the Yale Clock Company warranted the clock to be a good time-keeper; am I right?

Ans. Yes, sir; you are right.

61st X Int. Please look at the circular handed you and say if it is one of the circulars to which you refer as placed in the boxes of the Hotchkiss or Little Jewel clocks by the Yale Clock Company.

Ans. It is.

Complainants' counsel put in evidence the circular identified by the witness, and it is marked "Complainants' Exhibit Yale Circular," F. G. Ingersoll, Notary Public.

62d X Int. Please look at the circular now handed you and say whether circulars like it were also placed in each box con-
165 taining the Hotchkiss or Little Jewel clocks by the Yale Clock Company—the same being furnished by the plaintiff for that purpose.

Ans. Yes.

Complainants' counsel put the circular referred to in evidence, and it is marked "Complainants' Exhibit Parker & Whipple Circular," F. G. Ingersoll, notary public.

63d X Int. Was a sample clock furnished with the "Yale agreement?

Ans. There was a clock furnished.

64th X Int. The contract is in terms for six months from the commencement of delivery, and the delivery began on the 17th of June; why do you speak of the expiration of the contract as Nov. 1st, 1880, in your reply to the 20th Int?

Ans. By referring to the contract you will see that the delivery was not to be later than May 1st—this with the understanding that the tools then in their possession were perfect tools, made by the best workmen, expressly for this clock. When we received the tools we found them to be very imperfect, not fit for use. On reporting this matter to Mr. Breese he gave us orders to build a new set, which caused this delay in the delivery, and it was mutually agreed between Parker & Whipple Co. and the Yale Clock Co. that the delay was unavoidable on our part, and the contract was dated from May 1st, 1880.

65th X Int. You speak of increase of price upon renewal of the contract; was not the price increased during the existence of the contract?

166 Ans. The price was increased before any clocks were delivered.

66th X Int. And upon the 16th of June, 1880, was it not?

Ans. It was.

67th X Int. Who made the tools which you caused to be made in order to produce the Hotchkiss or Little Jewel clock?

Ans. George Griswold made the most of them. There might have been a few made in our factory by our machinist. I am not sure as to that.

68th X Int. Was this the same George Griswold who after that made dies for the defendants' clock?

Ans. It was.

69th X Int. Are you sure that the twenty two or three dies and punches for stamping and bending the different parts, furnished by Parker & Whipple, were duplicated before you began to make clocks under the contract?

Ans. I mean to say that they were all either duplicated or made over before we commenced the delivery of the clocks. We commenced making some parts of the clock with the first tools, but had to stop, owing to the reasons before stated.

70th X Int. How are you able to fix the dates when, as you say, you made the invention which is the subject of your letters patent?

Ans. I am able from the fact that I know I made application for a patent within a few days after I made the first model.

71st X Int. How long were you engaged in making that model?

Ans. Well, something more than one day. Between one and two days.

167 72d X Int. That was before Mr. Griswold had made your dies, I suppose? I mean the dies which he made for your clock.

Ans. It was; certainly.

73d X Int. How did you make the wheels that entered into the train, or portion of the train in front of the middle plate of your model?

Ans. The wheels were all made on one regular wheel-cutting machine—the same as we use now.

74th X Int. Is it your testimony as a clock-maker that clock wheels are "made" upon wheel-cutting machines?

Ans. The principal part of the making of a clock wheel is the cutting of the teeth on this machine.

75th X Int. You had to punch out the blanks for the wheels that went into your model with dies, did you not?

Ans. Not necessarily.

76th X Int. You did punch out the blanks for all the wheels of your model in front of the middle plate, did you not?

Ans. Yes, we did, and the wheels back of the middle plate also.

77th X Int. Did you punch out the blanks for the wheels in your model in front of the middle plate with Parker & Whipple's dies?

Ans. The wheels in the Parker & Whipple clock were the property of the Yale Clock Company until such time as they were assembled in a finished clock; so with all the parts finished by the Yale

Clock Company. I presume I took such parts of the Parker & Whipple clock as I needed to complete my model, such parts being common to all clock-makers.

168 78th X Int. I repeat, were the blanks for the wheels, in front of the middle plate of your model, cut out by Parker & Whipple's dies?

Ans. I presume they were.

79th X Int. You have no doubt about it, have you?

Ans. I don't think I have.

80th X Int. And in that model the spoking of wheel blanks in front of the middle plate was done by the Parker & Whipple dies, was it not?

Ans. The spoking and blanking is one operation by the same dies.

81st X Int. And in this case by Parker & Whipple's dies, if I understand you?

Ans. Parker & Whipple's wheel die, probably.

82d X Int. You have spoken of the use of your "regular wheel-cutting machine" in making those wheels in your model in front of the middle plate; did you use Parker & Whipple's cutter or cutters in cutting the teeth of these wheels?

Ans. Probably did.

83d X Int. And the machine was set in the same way as to cut teeth in the corresponding wheel of the Hotchkiss or Little Jewel clock, was it not?

Ans. It probably was.

84th X Int. How did you make the holes in the front plate of the frame for the pivots of the shaft?

Ans. They were drilled with a small drill.

85th X Int. Are you sure that it was not punched?

Ans. I am emphatically.

169 86th X Int. Did you make the holes in your front plate to correspond with the holes in the front plate of the Hotchkiss or Little Jewel? I mean the holes for the pivots.

Ans. I can't say there was any particular reference to the Parker & Whipple front plate; holes were made to accommodate, in the best manner, the train.

87th X Int. The holes for the pivots did in fact correspond, hole for hole, with the holes for the pivots in the front plate of the Hotchkiss clock, did they not?

Ans. They did.

88th X Int. That correspondence did not occur by accident, did it?

Ans. It did not.

89th X Int. The holes for the pivots in the middle plate corresponded with the holes for similar pivots in the Hotchkiss clock, did they not?

Ans. They did.

90th X Int. Were the pinions between the front and middle plate blanked out with Parker & Whipple's dies in that model?

Ans. Parker & Whipple never owned a die, while we made their

clocks, for blanking out those pinions; they were blanked out with one of our regular dies, and, having plenty of that class of dies, we never asked Parker & Whipple to furnish one for that purpose.

91st X Int. Were the teeth of the pinions between the front and rear plate of your model cut by Parker & Whipple's cutter in a machine set in the same way as when Parker & Whipple's pinions were cut?

Ans. I don't think I cut any pinions especially for this
170 model, it requiring only three or four; I think I took some that were in process of manufacture for Parker & Whipple's clock.

92d X Int. If so, the teeth were doubtless cut by Parker & Whipple's cutter, I suppose?

Ans. They were, undoubtedly. These cutters were made by the Yale Clock Co. for use in cutting the pinions in the Jewel clock, and were continually wearing out, requiring new ones to be made. The first set of cutters were paid for by the Parker & Whipple Co., and, by the terms of our agreement, we were required to keep this set of cutters in working order during the term of the contract, and, at the expiration of the contract, to deliver to them a set of cutters complete. The tools used in making the cutters were the same as used in making all cutters used in our factory, and were the property of the Yale Clock Co.

93d X Int. It is doubtless immaterial, but are you quite sure that you did not charge these successive cutters to Parker & Whipple and receive pay for the same?

Ans. It may be possible that we charged Parker & Whipple with every new cutter when it was put into use, but I won't be positive without looking at the books.

94th X Int. It resulted, did it not, from the way of making your model, that all the wheels in front of the middle plate corresponded, wheel for wheel, in size, shape, number of teeth and size of teeth, and position, relative to each other and to the center shaft, with the corresponding wheels in the Hotchkiss or Little Jewel clocks?

Ans. Yes.

95th X Int. And the same correspondence existed between
171 the pinions in front of the middle plate of your model and the pinions of the Hotchkiss clock, if I am right?

Ans. It did.

96th X Int. And the distance between the front and middle plate of your Patent Office model was the same as in the Hotchkiss clock?

Ans. I think it was.

97th X Int. And the pinion shafts were of the same length, were they not?

Ans. I think they were.

98th X Int. I presume I am right in suggesting that they were some of the very pinion shafts that were cut in the expectation that they would go into the plaintiff's clocks; how about that?

Ans. I presume you are right.

Adjourned to Thursday, December 28th, 1882, same place, at 10 o'clock a. m.

NEW HAVEN, CONN., *Dec. 28th*, 1882.

Met persuant to adjournment.
Present: Parties as before.

Cross-examination of witness LANE continued by Mr. MITCHELL:

99th X Int. How many of the Parker & Whipple dies were used in making the center shaft in making your Patent Office model?

Ans. There was only one die used on the center shafts of Parker and Whipple's clock, and that was a squaring die, which I presume very likely I did square that center with. This die is a common die used by all clock-makers for this purpose.

172 100th X Int. Do you mean this die or similar dies of different sizes were used by all clock-makers?

Ans. I mean dies made in this way for the purpose of performing this operation of squaring arbors and center shafts of other kinds of clocks made in other factories.

101st X Int. Do you mean that you had in your shop at that time any other die which was so shaped and of such size that it would give precisely the same effect in shape and dimensions in every way which you imparted to that center shaft by the Parker & Whipple die, excepting the Parker & Whipple die?

Ans. I do not mean to say that, but this same size, shape, and effect could be produced with a common file and vise in less time than it would take a good workman to set the die and punch in the press to perform the operation.

All but the first seven words objected to *or* irresponsive.

102d X Int. Would it be easier to produce that same size, shape, and effect with a file and vise than to put the shaft into the Parker & Whipple dies when they were in position for work upon the clocks which you were making for Parker & Whipple upon the Parker & Whipple dies?

Ans. No; it would not be as easy.

103d X Int. How many of Parker & Whipple's dies did you use in producing the pendulum of your model—I mean, of course, including bending dies?

Ans. I think I took a rod that had been bent for Parker & Whipple's clock.

173 104th X Int. Bent in Parker & Whipple's dies, I suppose, you mean?

Ans. Certainly.

105th X Int. How did your model compare in extreme height and width with the clock which you had been making for Parker & Whipple?

Ans. I think it fitted their clock case. There was no case on it.

106th X Int. Do the drawings of your patent show the exact size of the model, as you understand?

Ans. I think they do.

107th X Int. You speak of the increase of price by two and a half cents; were there no other increases in price than that one?

Ans. There were not on that contract.

108th X Int. When was the price increased two and a half cents on the contract?

Ans. The price was increased two and a half cents on the renewal of the contract, Nov. 1st.

109th X Int. The increase of June 16th was three and a half cents, raising the price from nineteen to twenty-two and a half cents, was it not?

Ans. It was.

110th X Int. The next increase was two and a half cents, was it not—making twenty-five cents on each clock?

Ans. It was.

111th X Int. If another increase was made, what was it?

Ans. The contract was continued from Dec. 1st for one month at thirty cents.

174 112th X Int. Did Parker & Whipple want you to make them further?

Ans. I believe they did.

113th X Int. Did you tell them you wouldn't make them at all—not even for fifty cents apiece?

Ans. I don't remember using that language, but do remember that we were unwilling to go any farther with the contract.

114th X Int. And you remember that when Parker & Whipple wished you to go on you declined to do so, do you not—on any terms?

Ans. I remember distinctly that when the contract was renewed, Dec. 1st, it was done to accommodate Parker & Whipple, and with the understanding that it should be the last renewal.

115th X Int. And Parker & Whipple having requested you to make for them farther you declined so to do, on any terms, if I am right?

Ans. I think we did.

116th X Int. Did you have the Yale Gem clock ready for shipment when you made the last delivery of Jewel clocks for Parker & Whipple?

Ans. I can't tell when we made the last delivery of clocks to Parker & Whipple, as there was five or six hundred sent back to us from Parker & Whipple to be repaired; but the first shipment of Gems was made during the latter part—I think the last week—of January, 1881.

117th X Int. I repeat; did you have the Yale Gem completed, in the form ready for shipment, when you made the last delivery of clocks to Parker & Whipple?

175 Ans. When we made the last regular delivery to Parker & Whipple, on Dec. 27th, 1880, we might have had a few samples.

118th X Int. By the way, who suggested the use of the word "Gem" for these clocks which you commenced to ship about the time you ceased to make the Parker & Whipple "Jewel."

Ans. I don't remember. There was a clock in the market called the Gem Cottage, and we selected the name Yale Gem.

119th X Int. I presume you recognize a kind of kinship in suggestiveness between the words Gem and Jewel as applied to two clocks so closely resembling each other as the two clocks in question, do you not?

Ans. I don't know as I recognize any more kinship between these two clocks than between clocks of other makers which resemble each other in size and appearance, or between watches of different manufacture.

120th X Int. Take, for instance, the clock you were making called "The Grandfather;" do you think the word "Grandfather" would have been as likely to suggest the Jewel clock as the word Gem applied to a clock of the same general size and appearance, especially when the same company had previously made both the Jewel and the Grandfather?

Ans. As the Grandfather had been on the market seven or eight months, I don't think it would.

121st X Int. The Jewel had been on the market several months, had it not?

Ans. I don't know how long before we commenced making the Jewel it was offered on the market.

122d X Int. Do you know when and by whom the word "Gem" was selected as the name of the Yale clock complained of?

176 Ans. I do not. By some member of the company, I suppose.

123d X Int. Do you know whether the expediency of adopting that name was talked over?

Ans. I don't know as we had any particular talk over using that particular name. I do know several names were suggested, and this adopted as a suitable one for the clock.

124th X Int. And was it not regarded as suitable for the clock because it resembled in suggestiveness the word "Jewel," in some such sense as the two clocks resembled each other?

such sense as the two clocks resembled each other?

Ans. It was not

125th X Int. Was the resemblance, in your judgment, wholly accidental?

Ans. The clock was introduced in the market with a square case instead of a round top, for the purpose of making it clear and distinct to the trade, and preventing any mistakes of buyers in either line of clocks.

126th X Int. I repeat, was the resemblance between the word Gem and the word Jewel—I mean was the adoption of the word Gem as a successor to the Jewel wholly accidental?

Ans. If there is anything in the word "Gem" that would suggest to a buyer the idea of a Jewel clock, I think the adoption of it was an accident, as this was what we labored to avoid.

127th X Int. The dials of the Yale Gem were made identical with those of the Little Jewel, were they not?

Ans. They were not.

128th X Int. The positions were the same, were they not?

Ans. The pointers were the same, and were furnished us
177 by Clark & Cowles, of Plainville, Conn., who also supplied us with our other kind of pointers.

129th X Int. So far as you know were the dies in which the Yale Gem pointers were cut expressly made, originally, for the Hotchkiss or Little Jewel?

Ans. I never asked Clark & Cowles that question and don't know anything about it.

130th X Int. Did you know of any other dies which would cut the precise size and shape of pointers for the Yale Gem clock excepting those from which Clark & Cowles furnished you the pointers for the Little Jewel?

Ans. Clark & Cowles were furnishing us with all of that class of material and we should have ordered these hands from them without any regard to their having dies just that shape, as they make all kinds of pointers which they receive orders for.

Objected to as non-responsive.

131st X Int. Did you ever see an hour hand on a clock in the market, or in the course of manufacture, like the one which you copied from the Jewel into the Gem?

Ans. There is such an endless variety of sizes and shapes of hands bearing the same name it would be impossible for me to recall and remember all I have seen. This style of pointers is called the "spade," which is a common style in all sizes and varieties of clocks and watches.

132d X Int. I repeat, did you ever see in a clock, either in the market or course of manufacture, an hour hand so constructed with reference to the method of fastening it upon the socket as the Gem hand or the Jewel hand before it was made for the Jewel clock?

178 Ans. Yes, I have.

133d X Int. When first?

Ans. Well, I can't say when, but think I can produce or bring some hands made about eighty years ago which were the identical thing in manner of fastening to the socket.

134th X Int. Are you quite certain of even that?

Ans. I am very positive and am ready to produce the article, with sufficient proof as to its use in common practice at the time stated.

135th X Int. Did you know of a clock made in the United States that had pointers with split heads on the center or over a socket at the time when you began to be furnished with the pointers for the Little Jewel clock?

Ans. I don't know as I knew of this particular fastening being used at that time, but knew of the kinds then in use, one of which amounted to about the same thing, only it made a stronger and better fastening. I mean to say this last-mentioned one made a stronger and better fastening.

136th X Int. Can you swear that the pointers to which you refer as used eighty years ago had split heads and were otherwise precisely the same as those in the Little Jewel and Yale Gem clocks?

Ans. No; I can't swear that they were precisely the same, for they were larger and of a different pattern, but had the split heads.

137th X Int. You say, in reply to the 35th int., that the Yale Company did not manufacture their clock before January, 1881; am I right in understanding that they made samples prior to Jan., 1881?

179 Ans. I think we did make a few samples to work by; am not positive on that point.

138th X Int. Those samples were probably the movements referred to by Mr. Roys in his testimony as made in the month of Dec.—were they not?

Ans. I don't know what Mr. Roys referred to in his testimony, as he was entirely wrong as to the quantity.

139th X Int. Mr. Roys says, in reply to the int. 13, that the Yale Company made a few of the Yale Gems before the 1st Jan., 1881. That I do not understand you to dispute; am I right?

Ans. I think the company made a few samples in December. As fast as the tools—I mean dies and punches—for the Gem were completed they were put in in the press, and enough parts pressed by them to see that the tools were right for that particular part. I think the dies and punches for the Gem were all completed before the 1st Jan., and we put up a few sample clocks.

140th X Int. Did the sample clocks put up in Dec. go through Mr. Roys' hands?

Ans. I can't say as to that.

141st X Int. Mr. Roys being asked to give the number as nearly as he could of Yale Gems made before the 1st Jan., 1881, replied about a hundred, more or less. Have you examined your books to know the precise number?

Ans. I have.

142d X. You may give the precise number as ascertained from your books.

Ans. I find that we commenced making Gems the third day of Jan., 1881. There is nothing on the book to show that we
180 made any before the 1st of January. In speaking of the samples I speak from memory.

143d X Int. How many less than one hundred can you testify with certainty that there was of these December clocks or clock movements?

Ans. I can't testify to any with certainty.

144th X Int. What do you mean by saying that the Yale Company commenced making Gems Jan. 3d, 1881?

Ans. I mean that we made it our business to arrange the tools in the different presses for pressing the parts, and started all the other operations on the different parts, preparatory to assembling these parts in the movements ready for finishing and casing.

The witness produces the movements called for by complainants' counsel, and it is put in evidence by complainants' counsel and marked "Complainants' Exhibit Grandfather's Clock Movement, F. G. I., N. P."

145th X Int. You say that George Griswold made the dies and tools used by the defendant company in making the Lane clocks; then you know whether these tools were made by him, or his workmen, in a special room which was then for the first time hired for that purpose by Mr. Griswold?

Ans. I do not know that they were made in any private room hired for that purpose.

146th X Int. Do you know that Mr. Griswold hired a special room and put up a bench and other appliances for the purpose of making these dies?

181 Ans. I know that Mr. Griswold occupied, with one or two workmen, an adjoining room where some of these dies were partly made. I know also that as many of these dies were made in his regular workshop as in this room mentioned; also know that all these dies were finished, hardened, and tempered in his regular workshop, and were exposed to view in the shop the same as other work.

147th X Int. Do you wish to have it understood as your testimony that you did not request any degree of secrecy of Mr. Griswold or any of his workmen?

Ans. I think we instructed Mr. Griswold not to say anything to Parker and Whipple, or any one else, in regard to these tools. I think so because we always have that understanding with Mr. Griswold or any other machinists who are building tools for any of our new work.

148th X Int. Why do you think you referred to Parker and Whipple in this special case?

Ans. Because they were the only persons interested in the clock business that frequented this particular machine shop, to my knowledge.

149th X Int. Explain what you mean by the qualification "to my knowledge." Who on behalf of Parker & Whipple frequented this machine shop?

Ans. By my knowledge I mean that I had never met any representative of any clock company in this place, except Mr. Breese and Mr. Hotchkiss, of the Parker & Whipple Co. Mr. Hotchkiss frequented this place.

182 150th X Int. Do you mean Mr. Hotchkiss, the inventor of the plaintiffs' clock?

Ans. I do.

151st X Int. Had he an office or workshop adjoining Mr. Griswold's?

Ans. He had a place or a room at one time adjoining, but I am not sure that it was during the time Mr. Griswold was building the tools.

152d X Int. Now, if by reason of Mr. Breese and Mr. Hotchkiss being (the latter frequently) in Mr. Griswold's you enjoined upon Mr. Griswold not to say anything to Parker & Whipple, don't you think you intended and expected that those tools should be kept out of their sight while they were being made?

Ans. I intended they should be kept, as far as possible, out of every one's sight who had no business to know about them.

153d X Int. Do you intend your last answer to be equivalent to the answer yes?

Ans. Well, yes; I guess I do.

154th X Int. And if you expected and intended they should be kept out of sight you doubtless said as much to Mr. Griswold, did you not?

Ans. I presume I did.

155th X Int. Was not this bench put up in the adjoining room with special reference to making these tools and facilitating the keeping them out of sight?

Ans. I don't think it was, because there was other work started in this room previous to this, and the most work was done in the regular workshop.

183 156th X Int. Was not the roughing up of the work done in the main room and that finer work, which gave shape and special character to the tools, done in the special room?

Ans. To the best of my knowledge there was more work of this character done in the main shop than in this special room. By "this character" I mean fine work which gave "character to the tool."

157th X Int. Were you not in any way privy to the hiring of this special room, either as advising it, requesting it, or otherwise?

Ans. I had nothing whatever to do with it.

158th X Int. Do you mean by your last answer that you neither advised or suggested or concurred in the hiring of the special room as an advantageous step in the direction of privacy?

Ans. I mean to say that I had nothing whatever to do in any shape with the hiring of the room, but don't think I raised any objections to Mr. Griswold's building the tools in this room.

159th X Int. Do you mean by the last answer precisely the same thing as would have been expressed if you had answered yes?

Ans. Yes; of course I do.

160th X Int. Do you know whether any of the work on these tools done in the main room was done out of regular hours?

Ans. Yes; I do.

161st X Int. A good deal of it?

Ans. I requested Mr. Griswold to push the work as fast as possible, and understood he had several men who were willing to work evenings, and I believe they did.

184 162d X Int. Do you mean to be understood that any considerable portion of the special work that gave individuality to the tools was done in the main room in regular hours?

Ans. I do.

163d X Int. Did not you expect that if Mr. Hotchkiss came into the regular room this work would be in some way concealed from him?

Ans. I did not.

164th X Int. Why, then, did you enjoin upon Mr. Griswold not

to say anything to Parker and Whipple—because you knew that Mr. Hotchkiss frequented this room?

Ans. Because Parker and Whipple or Mr. Hotchkiss had no right nor business to know.

165th X Int. How did you enable Mr. Griswold to know precisely the shape of the tools you wanted him to make so far forth as the work to be done duplicated the work done on the Little Jewel clock?

Ans. I gave them a model or pattern of each particular piece.

166th X Int. Did he at any time have any of Parker & Whipple's dies for that purpose?

Ans. I don't think he did; it was unnecessary.

167th X Int. May he have done so?

Ans. He might have done so if he desired—no occasion for it.

168th X Int. On reflection do you not now think that he did have some of Parker & Whipple's dies for that purpose?

Ans. I am very sure that he did not.

169th X Int. In what order were the principal tools finished by Mr. Griswold?

185 Ans. I can't say positively.

170th X Int. Which were made first—the tools having to do with the making of the frame or the tools having to do with the running portion.

Ans. I think the frame dies.

171st X Int. Of the tools having to do with the making of the running part, were not those made last which did the work that was adapted to either the Little Jewel or Yale Gem?

Ans. I think very likely they were.

172d X Int. When were the last tools finished?

Ans. I can't tell without looking the matter up.

173d X Int. Give as nearly as you can without looking it up.

Ans. I can't possibly tell without looking it up.

174th X Int. Was it in January, 1881?

Ans. It might have been.

175th X Int. How many may have been finished in January, 1881?

Ans. I can't say as any were. I should rather look that matter up before I undertook to tell.

176th X Int. Is it not true that they were not all done when you made the first Yale Gem clocks?

Ans. I can't say without looking [up] the matter—it may be possible.

177th X Int. Is it not true that the first Yale Gems you made had in them parts which were produced by Parker & Whipple's tools?

186 Ans. It may be true. I am quite sure that whatever of wheels suitable for our clock that were left over from the manufacture of Parker & Whipple's clock were used in the Gem clock. I am quite sure that Parker & Whipple never asked for or offered to take off our hands any of the parts that were left over from their clocks.

178th X Int. On the contrary, did you not send and did not

Parker & Whipple receive a considerable quantity of various parts that were left over when you got through making clocks for them?

Ans. I do not remember sending any parts to Parker & Whipple, only those parts which were furnished by Parker & Whipple, such as internal gears, with the exception of a few parts, such as rivets, which I presented to Mr. Breese on receiving an inquiry from him of where we bought such work.

179th X Int. Did you not send a lot of "centers" to Parker & Whipple?

Ans. I might have done, but don't remember it.

180th X Int. Referring now to int. 177 and the answer and your statement that you used whatever of suitable wheels were left over, do you mean that the Yale clock made in December had parts that were left over in January subsequently?

Ans. I mean the few samples that were made in December had in their construction wheels and pinions that were in process of manufacture for Parker & Whipple's clock probably.

181st X Int. Did you not make up a batch of wheels with Parker & Whipple's dies with reference to their being left over, as you
187 call it, to be used in connection with those parts of your own equipment of tools which were finished before the dies were finished for completing the wheels?

Ans. I am very positive that we did not.

182d X Int. Did you refuse to deliver up Parker & Whipple's dies until there was a full settlement between you?

Ans. I believe we did.

183d X Int. Did you not regard Parker & Whipple as pecuniarily responsible?

Ans. We did, but we wished a settlement within a reasonable time.

184th X Int. Did you expect a breeze with Parker & Whipple?

Ans. I believe not; everything was pleasant.

185th X Int. Then, if you did not expect trouble, and regarded them as responsible, why did you hang on to their dies after they requested them and after the contract was over, if you didn't want to use some of them?

Ans. The action was taken by the then secretary of the company, who regarded it as a business precaution tending to effect a more speedy settlement.

186th X Int. Did not the product of some of those dies go into the clocks, on some of them that were put together and marketed in Jan., 1881?

Ans. I think, as stated before, that some of the parts left over from the Parker & Whipple—such as wheels and pinions—were used, and I am very sure that the company had a perfect right to do so.

188 187th X Int. Did not some of the clocks sold in February, 1881, have parts that were cut with Parker & Whipple's dies?

Ans. I don't think they did.

188th X Int. Was the die which Griswold made for cutting the

center collet for the friction washer adapted to cut the same collet for use in the Little Jewel?

Ans. About the same thing.

189th X Int. Was the die which Griswold made for cutting the shuck pinion of the dial work adapted to cut the same part for the Little Jewel?

Ans. I believe it was.

190th X Int. Were the dies for bending the pendulum and the upper end of the pendulum severally adapted for producing the corresponding parts of the Little Jewel?

Ans. They were practically the same.

191st X Int. Was the die for producing the friction washer on the center adapted for producing the corresponding washer in the Little Jewel?

Ans. It was not.

192d X Int. Was the difference anything more than a mere matter of reaming the hole?

Ans. It was.

193d X Int. What was it?

Ans. Well, the washer was larger for the Gem than it was for the Jewel; the washer was more dished; the hole was smaller; the base was thicker.

194th Int. Were the dies for rolling the thread on the pendulum rods the same for both clocks?

189 Ans. They were made substantially in the same manner.

195th X Int. Was the same true of the dies for cutting and spoking the wheels?

Ans. The dies for pressing the wheel blanks were substantially the same.

196th X Int. And the same was true of the two or more dies for the pinions, other than the center piece?

Ans. Those dies were the property of the company and were used for both clocks—regular collet dies.

197th X Int. And were the dies for producing the pendulum nuts adapted for use in both clocks, interchangeably?

Ans. They were.

198th X Int. Was the die for punching the center wheel from the middle plate the same for both clocks so far forth as it discharged that function?

Ans. It was not.

199th X Int. What was the difference?

Ans. The difference was in the shape—general make up of the die from beginning to the end.

200th X Int. Please have the last question read again, and see if you cannot say that the die in question, so far forth as it operated to punch the center wheel blank out of the middle plate, was the same for both clocks?

Ans. This die was a regular blanking die in both cases, this center wheel blank being pressed from the plate and the plate pressed from the sheet metal at the same stroke of the press, giving the plate its outside shape and all its holes, excepting the pivot and

rivet holes and pillar holes in the Gem clock, and in the Jewel clock the pivot holes.

190 201st X Int. Was not the center wheel blank and the hole left after punching it the same in both checks?

Ans. It was, but could not be done in both cases with the same die.

202d X Int. Then the die that cut the hole had to be of the same operative shape in discharging that function, did it not? Of course I do not mean that the same blocks of metal did not have cutting edges which were adapted subsequently to cut in each case the exterior shape of the middle plate?

Ans. The die that discharged that function, or the part of the die, simply cut a round hole in precisely the same manner as all dies that cut round holes in sheet metal do.

203d X Int. And the blanks cut out by that die would make cutting wheels for either clocks, would they not?

Ans. The blanks at that stage of manufacture were suitable to be finished up as center wheels for either clock.

204th X Int. Which of the several dies and punches to which your attention has been called in the last few questions are the two dies and punches which you were able to call to mind in your answer to the 42d int.?

Ans. I stated the wheel die and the pendulum-nut die.

205th X Int. By the way, I notice that either of the keys of the Jewell and Yale Gem clocks will fit the square end of the center arbor of either clock. Am I right in inferring that the dies for squaring those ends are substantially the same?

Ans. The dies for squaring arbors in all clocks are substantially the same as these.

206th X Int. Are they all of the same size and adapted to
191 produce the same length of impression upon the arbor or shaft?

Ans. They are, accordingly as the gauges are set.

207th X Int. When did the clock-makers adopt a standard size for squaring arbors?

Ans. I don't understand that I stated that fact.

208th X Int. Then the dies for squaring arbors are different, are they, as used by different clock-makers?

Ans. The dies for squaring arbors used by different clock-makers are substantially the same in construction, and in their operation can be adjusted to place squares in different lengths on the arbor, and to vary considerably the size of the square.

209th X Int. I will put the question in another way. Has your attention been called to any ordinary clock keys that will fit the square portions of the center arbors of the Little Jewell and Yale Gem clocks?

Ans. It has not; but I think they are common.

210th X Int. You say that in Jan., 1881, you furnished Mr. Breese, at his request, with a Yale Gem clock. Did he claim that you were trespassing upon complainant's rights?

Ans. I don't remember his saying so.

211th X Int. Did he afterwards complain?

Ans. Well, we had some talk about it after the first reissue.

212 X Int. What did you understand he wanted that clock for in January, 1881?

Ans. He said he wanted it for himself—the first clock.

213th X Int. How about the second?

Ans. He said he wanted another.

214th X Int. Did you not understand at that time that Mr. Breese claimed that clock was an infringement?

192 Ans. I don't think I did understand it so.

215th X Int. Did he not so state?

Ans. I do not remember of Mr. Breese making such statement until after the first reissue.

216th X Int. Was not this subject the matter of talk frequently between yourself and Mr. Breese?

Ans. I had several conversations with Mr. Breese prior to January 1st, 1881, in regard to these clocks—the Gem and the Jewel.

217th X Int. In none of these did he claim that the Yale Company was trespassing upon the rights of the Parker & Whipple Co.?

Ans. I don't remember of his making any claim to that effect, only as his conversation would show that he felt bad to think we were to stop the manufacture of the Jewel.

218th X Int. Did you not get the idea from those conversations that Mr. Breese regarded the manufacture of the Yale Gem as a trespass upon the rights of the Parker & Whipple Company?

Ans. I had particular reason to think that Mr. Breese regarded this more as a competitor with the Little Jewel than a trespass on his rights.

219th X Int. I did not ask for a statement of the relative importance which he gave to these two sources of complaint, but asked simply whether you got the idea from him that he regarded your company as a trespass. So understanding, please answer the question.

A. I don't remember that I got that idea from Mr. Breese.

Adjourned to Friday, December 29th, 1882, at 10 o'clock a. m., same place.

193 NEW HAVEN, CONN., *December 29th*, 1882.

Met pursuant to adjournment.

Present: Parties as before.

Cross-examination of witness LANE continued by Mr. MITCHEL:

220th X Int. Considered as dials, were the dials on the Yale Gem and Little Jewel alike?

Ans. They were not; the style of figures was different.

Redirect examination:

221 R. D. You have been enquired of by complainant's counsel with much particularity of detail, as to the clock parts that you took from the material in the Yale Company's shop and the tools that you

used to make up your patent model. Without calling each one of those parts or tools to your notice *seriatim*, please state whether, in what you did in that respect, you supposed that any one of those parts or tools so taken or used by you contained any feature of invention belonging to Mr. Hotchkiss or any one else, or had any use in carrying out any such invention.

Ans. I did not suppose so.

222 R. D. And so, in respect of the material that may have been used by you subsequently in making up the Yale Gems that were sent into market in January, did you suppose that any invention belonging to Mr. Hotchkiss or the complainant was embodied therein?

Ans. I did not; I knew to the contrary.

223 R. D. Had you any reason to suppose that Mr. Hotch-
194 kiss or the complainant would object to your making such use of that material by reason of any rights which they might have under the Hotchkiss patent?

Ans. I had not in the least.

224 R. D. Had you any reason to suppose that in so doing you were trespassing upon their rights in any respects?

Ans. I had not the slightest.

225 R. D. Did any one, other than the Yale Clock Co., have any property interest in the material so employed by you?

Ans. No one.

226 R. D. Could you without any difficulty have procured such material and tools as I have referred to from other sources, if it had been necessary, or for any reason desirable?

Ans. I could have procured the material from other sources or could have made the parts employed in this model without the use of any of Parker & Whipple's tools by hand work.

227 R. D. In reply to 172d X int. you stated that you could not tell, without looking the matter up, when the last of the tools for making the Yale Gem were finished. Are you able to state now more definitely when it was?

Ans. I am.

228 R. D. When was it?

Ans. Mr. Griswold commenced the tools Oct. 23d, 1880, and delivered the last on Dec. 18th, 1880.

229 R. D. At what date, do you know, that Mr. Hotchkiss had actual knowledge of the intention of the Yale Company to make the Yale Gem clock?

Ans. On Thanksgiving day, 1880.

230 R. D. What reasons have you for that knowledge?
195 Ans. Mr. Hotchkiss came to my house on that day and said that he understood we were to make a small clock the same size as his; I told him it was—no secret about it whatever.

231 R. D. State, more particularly than you have, the reasons for your company going into the manufacture of a little clock, and of your invention in connection with such manufacture.

Ans. Well, we experienced a great deal of difficulty in the manufacture of the Little Jewel by reason of its complicated construction,

and felt that in continuing such manufacture we would seriously damage our reputation as clock-makers, and we wished to put on the market a sensible, practical, and durable small pendulum clock.

232 R. D. Had your experience in the manufacture of the Little Jewel clock satisfied you that it had not these qualities to which you have referred as desirable in a small pendulum clock?

Ans. It had.

233 R. D. Basing your opinion upon that experience, had the Little Jewel clock, at the time you made your invention of the Gem clock, proved itself to be commercially successful?

Ans. It had not.

234 R. D. Give your reasons for that opinion.

Ans. Well, we had frequent complaints from Parker & Whipple, and from parties having bought the goods; also we were obliged to take apart and destroy from five to fifteen hundred in a single month's work by reason of the imperfections in the internal gear furnished by Parker & Whipple and the consequent imperfect action of the several parts which had direct connection with the internal gear.

196 235 R. D. At the time you made your invention, or when the Yale Co. determined to manufacture the Yale Gem clock, what was the reputation, as you understood it, in the market of the Little Jewel clock?

Ans. I understood it to be bad.

236 R. D. What was the trouble with the clock that impaired its reputation?

Ans. The trouble with the clock was the complication of parts in connection with the internal gear to transmit the power from the spring to the train, making it impracticable to manufacture with success as a cheap clock.

237 R. D. Was there any difficulty resulting from this internal gear that affected the spring action and made the clock at times impracticable?

Ans. There was a considerable.

238 R. D. Explain it.

Ans. I don't know as I can give it on paper. As a result of the freedom required for the rotating plate, and, again, for the traveling wheel fastened to that plate, and, again, for the center shaft, which required a certain amount of end shake, and, again, for the center pinion, which was free to act independent of the center wheel, the center pinion would at times disconnect itself from the wheel which transmitted the power of the spring to this pinion and cause the spring to suddenly unwind with great force, sending the clock into the air and totally ruining this part of the mechanism.

239 R. D. Calling your attention to the letter of May 1st, 1880, contained in the circular which has been put in evidence as an exhibit, did your experience in the manufacture of the

197 clock cause you to modify, in any respect, the opinion therein expressed concerning the wear of its movements?

Ans. It did; we found that this test mentioned in the letter of the

circular did not show the defects which were afterwards developed by the actual use of the clock with the spring power attached to run them in place of the latter.

240 R. D. Have any of the Little Jewel clocks been put on the market, to your knowledge, since those manufactured by your company were sent into the market?

Ans. I have been unable to find any, although I have looked through the markets and have applied several times to a party in the trade who has had some ordered about a year. I have not enquired for any during the last month until yesterday.

Counsel for complainant- objects to all evidence which may be claimed to prove want of utility of the Hotchkiss invention on the ground that no basis is laid in the answer, and states that he has understood heretofore and still understands that no claim is made or to be made of that character.

Counsel for defendant- claims the evidence as showing the reasons for the Lane invention and for their going into the manufacture of the Lane clock, and therefore as answering the charges of bad faith made in the bill.

241 R. D. State the reasons controlling your company in not continuing the contract with the complainants' company.

198 Ans. The company found that they had lost a considerable sum of money in the manufacture of the Little Jewel, and felt that even if they could net a reasonable profit they would inevitably get a reputation as clock-makers, which would be damaging to their future business.

242 R. D. You have been enquired of as to the motives of the company in naming their clock the Gem. Was it any part of that motive that you might avail yourself of the reputation that had been acquired by the Little Jewel clock in the market?

Ans. It was quite the contrary.

243 R. D. Had the selection of that name any reference whatever to the name of the Little Jewel clock?

Ans. It had none whatever.

244 R. D. Does each kind of clock bear some distinct trade name in the market, generally?

Ans. They do; embracing an endless variety of names.

245 R. D. Can you give any idea in numbers of that variety?

Ans. I should say not less than ten thousand, including names that have been in use and are now in use.

246 R. D. Is the Gem Cottage a well-known name for a variety of clocks?

Ans. The Gem Cottage is a common style and name with most of the makers; is a standard article in the market, and has been for five or ten years.

247 R. D. Did your company, upon entering upon the manufacture of the Gem clock, endeavor to avoid points of resemblance which might strike the eye of a purchaser and the trade between the two clocks? If so, state what they did in that respect.

199 Ans. The company introdnced the Gem clock with a square top case—a square dial-mat—which occupied the entire front of the case—made a different shaped pendulum ball, these differences requiring more material, labor, and expense. The Jewel clock had a small round mat, just the size of the dial circle—the case was a round top—the top and sides of one piece of metal with only two joints to solder, while the Gem case was composed of four distinct parts, with beaded sides and tops, and six joints to solder. The mat in the Gem clock required about twice the quantity of metal that the mat of the Jewel —, these differences requiring also much greater expense in building the tools as well as the manufacture of the articles.

248 R. D. Why was this difference in outward appearance given to their clock by the Yale Company?

Ans. In order that dealers might be able to distinguish between the clocks.

249 R. D. In your answer to the 218 X int. you say that you had particular reason to think that Mr. Breese regarded the Gem clock more as a competitor of the Little Jewel than a trespass on his rights. What particular reason had you in mind?

Ans. By reason of a proposition Mr. Breese made to me some time during the month of December, 1880.

250 R. D. What was the proposition that you refer to?

Ans. The proposition was this: That as there was no room for two small clocks on the market the Yale Company might figure up what profit they could make on the Yale Gem, and the Parker & Whipple Company would make that profit good to the Yale Company in the manufacture of the Jewel, providing the Yale Company would not make any Gems.

200 Recross-examination by Mr. MITCHELL:

251 Re-X. Are you interested in the result of this suit by reason of receiving a continuing royalty from the Yale Clock Company under your patent of the Gem clock?

Ans. I am interested in the result of this suit by reason of being a stockholder in the company and by reason of holding a responsible position in the management of this company more than by any royalty I receive on these clocks.

252 Re-X. What sums have you received as royalties heretofore?

Ans. I have received two cents apiece royalty.

253 Re-X. Who received the remainder of the royalty, and what is the amount?

Ans. Mr. Pascal Converse; the same amount.

254 Re-X. Give the aggregate of your royalties heretofore.

Ans. I can't do it unless I refer to the books.

255 Re-X. As nearly as you can.

Ans. I can't attempt to say without reference to the books.

256 Re-X. Give as nearly as you can without reference to the books.

Ans. Well, I should say an average of one hundred dollars a month.

257 Re-X. Does your royalty extend for the life of the patent?

Ans. It does, if the company makes the goods during that time.

258 Re-X. How comes Mr. Converse to have a royalty on your patent?

Ans. Because he bought it and paid for it.

201 259 Re-X. Was the pendulum ball of your model the property of Parker & Whipple?

Ans. I can't say as to that.

260 Re-X. Then you cannot say it was not their property?

Ans. No.

261 Re-X. Were any of the tools delivered in December, 1880, by Mr. Griswold changed or repaired or otherwise perfected after they were first delivered, and before they were finally regarded as adapted to successful use?

Ans. I think very likely they were. This is the case generally with new tools.

262 Re-X. Do you mean, by your replies to 230th and 229th interrogatories, that Mr. Hotchkiss knew, on Thanksgiving day, 1880, that you were going to make the Yale Gem clock, or do you simply mean that he knew you were going to make a small clock of the same size as his?

Ans. We had not at that time adopted any name for this clock. I simply answered Mr. Hotchkiss' question when he asked me if we were going to make a clock about the size of his.

263 Re-X. Then Mr. Hotchkiss knew nothing of the construction of the movement of that clock which he asked about, so far as he disclosed to you, or as you know; am I right?

Ans. I think you are wrong.

264 Re-X. I understand you to say that Mr. Hotchkiss asked if you were going to make a small clock, the same size as his, and that you answered in the affirmative; did you on that occasion tell him or did he know that you intended to copy a portion of his clock so closely that several of his wheels, pinions, and shafts would

202 be interchangeable with the corresponding parts of his clock?

Ans. I did not tell him anything about the construction of the clock.

265 Re-X. You speak of an apprehension which the company had that it would damage the reputation if it continued to manufacture the Little Jewel clock; to whom, if to anybody of the Parker & Whipple Co., did you express that apprehension?

Ans. I can't say that I did to any of the Parker & Whipple Co.

266 Re-X. Did the Parker & Whipple Co. not only request you to continue the manufacture of these clocks, of which nearly fifty thousand had been made in about six months, but also to increase your facilities for producing them?

Ans. I think Mr. Breese, at one time in conversation with me, a month or two before we stopped making, said that they probably should want a larger quantity than we were producing, but no request from the Parker & Whipple Co. was made to the Yale Co. to increase the supply; on the contrary, Mr. Hotchkiss stated to me

that the Parker & Whipple Co., at the rate of the supply at that time, would have by Christmas one thousand dozen on hand.

267 Re-X. You intimate that the Little Jewel proved itself commercially unsuccessful, giving as one reason frequent complaint from Parker & Whipple; did they complain of anything excepting the character of the workmanship?

Ans. On the contrary, they always spoke, as far as my knowledge goes, in the highest terms of the workmanship.

268 Re-X. What, then, was the ground of their frequent
203 complaint to you in regard to the clock; it was not because you made the same kind of clock that you contracted to make, was it?

Ans. As the agreement called for a clock as good or better than the sample, and as the sample would not run at all, I think not.

269 Re-X. What were the imperfections in the internal gears furnished by Parker & Whipple which caused you to take apart certain clocks, as stated in your answer 234?

Ans. The teeth on one side of the circle were too long, the teeth on the other side were too short; the recess turned for receiving the sheet iron was, in some cases, too shallow, in some cases too deep, in some cases too large; so, also, with the recess turned for receiving the pillar-plate; in some cases the teeth of the internal gear would break off.

270 Re-X. By whom were these internal gears made, and was it in the same building where the Yale Clock Company's business was carried on?

Ans. The teeth of these internal gears were cut by the Winchester Repeating Arms Company. The rest of the work was done under Mr. Hotchkiss' (the inventor of this clock) supervision in a room in the same building occupied by the Yale Co., there being no doorway between this room and the Yale Company's.

271 Re-X. You had the right of inspecting these gears before accepting them for use in the clock, did you not? Please answer yes or no.

Ans. We did inspect these gears and used the best we could pick out and select.

204 272 Re-X. If you had been given authority could you have made those gears so as to not have the imperfections you have referred to?

Ans. I could have remedied the recessing, but could not have remedied the imperfections of the teeth.

273 Re-X. Why not?

Ans. I could not have remedied it because these imperfections were caused by the process of making or cutting teeth partly and partly by the stock from which the brass tubing was made.

274 Re-X. Could not the internal gears have been made in such a way as to have good material?

Ans. I presume they could.

275 Re-X. Could not a skillful clock-maker or machinist with the proper tools have cut teeth regularly?

Ans. I have no doubt that they could have been cut with the proper tools.

276 Re-X. You refer in 230th answer to what you regard as a difficulty resulting in "sending the clock into the air;" could not that difficulty, if such it was in any case, have been remedied by a slight adjustment of the center pinion relative to the traveling or planet wheel?

Ans. It could not without a radical change in the entire construction of those parts acted upon by this internal gear.

277 Re-X. What would have been necessary in order to make the planet wheel act upon the center pinion far enough from its edge so that it would not slip off in the occasion that you have referred to? Give the simplest change that you can think of.

Ans. Well, in the first place it would require a thicker
205 planet wheel, a thicker pinion, a deeper recess in the center of the rotating plate, requiring a change of tools (of die and punch) for stamping the disk, a longer center shaft, more space between the rotating plate and the pillar plate, a thicker or deeper internal gear, a deeper recess to the rear of the internal gear. It would require some other changes that would be apparent only on the adoption of these mentioned.

278 Re-X. Will you swear that the difficulty could not have been remedied by simply sliding the pinion backward on its shaft and slightly changing the size and shape of the adjacent parts so as to form a recess for that purpose?

Ans. These changes would have been as necessary in that case as in the case of making the pinions thicker, as stated in the previous answer. Sliding the pinion backward on its shaft would have disconnected the click from the ratchet which was fastened on this pinion, said click being fastened to the center wheel. If the center wheel had been carried back with this pinion it would have been disconnected from the pinion into which it meshes to transmit power to the train.

279 Re-X. Could the difficulty have been remedied by slightly elongating the pinion in the direction of the rear of the clock and shaping the adjoining parts so as to make a little recess for that purpose?

Ans. The elongation of this pinion would necessitate the changes mentioned in answer to the 277th int.

280 Re-X. Can you not answer the last question in the affirmative truthfully?

Ans. I cannot.

281 Re-X. The first change spoken of in 277th int. is the
206 thickening of the planet wheel; can you truthfully say that that would be indispensable in the case suggested in 279th int.?

Ans. In the light of my experience with these clocks this change would be necessary.

282 Re-X. Would it be indispensable in case the pinion were so elongated that the planet wheel could not slip off from its edge?

Ans. It would be indispensable in order to make a good, durable clock.

283 Re-X. Would making the planet wheel a little thicker constitute a change in the general organization of the clock?

Ans. That part of the clock pertaining to the internal gear.

284 Re-X. Is not the planet wheel in the Hotchkiss clock as thick as the main wheel in ordinary clocks?

Ans. I think it is. About the same as mine, I think.

285 Re-X. Now, will you tell me why you insist that elongating the pinion in the direction of the back of the clock would require a longer center shaft, or were you mistaken in that?

Ans. I was not mistaken. This center shaft was just long enough to accommodate this thickness of pinion and give it free action; consequently the center shaft would have to be enough longer to accommodate a longer pinion and give it free action.

286 Re-X. Would not the recess, in the case supposed, allow the free action without lengthening the shaft.

Ans. It would not; a deeper recess with a longer pinion would simply allow the pinion, if placed on the shaft without moving the center wheel, to come in contact with the rotating disk, which moves slower than the center pinion, and cause the clock to stop
207 by reason of the two parts binding together instead of having free action.

287 Re-X. You say you enquired for a Little Jewel clock yesterday. Did you find one in the market?

Ans. I ordered a dozen of Mr. Reese. I have not received them yet.

288 Re-X. You speak of the effort of your company to avoid giving the Yale Gem an external appearance like the Little Jewels. Did you make a detachable base for your clock that was substantially the same in general outlines with the independent base of the Little Jewel clock?

Ans. We made a base for our clock which was entirely different in appearance, and could in no way have been taken for a Parker & Whipple base, and was made of a different pattern.

289 Re-X. Were independent bases used with small clocks before the Little Jewel?

Ans. I can't say positively, but I never had any reason to suppose they were not used before.

290 Re-X. Did you ever know of their being used before?

Ans. I don't remember any particular clock now.

291 Re-X. Do you remember any independent base of any pattern?

Ans. I say I do not remember a base of any pattern.

292 Re-X. I understand you to say that you carefully examined the claims of the original Hotchkiss patent to see that you were outside of them. Did it at any time occur to you that the law gave a right of reissue?

Ans. It so occurred to me, along in March some time, when I saw Mr. Hotchkiss' reissue.

208 293 Re-X. My question related to the time when you ex-

amined the original patent of Mr. Hotchkiss. Were you not then aware that the law gave a right of reissue for patents?

Ans. I was aware of this.

294 Re-X. And being aware of it, you and your company concluded to take your chances, I suppose. Am I right?

Ans. You are not right. We examined this patent with regard to the rights of Mr. Hotchkiss in that patent, not knowing or supposing that Mr. Hotchkiss had any intention or any reasonable rights to reissue.

295 Re-X. You had never been informed by him that he intended to waive his rights of reissue, had you?

Ans. I had been led to believe by Mr. Hotchkiss' conversations that his patent covered, in his belief, the only way to make a cheap clock of that size. I refer to his original patent.

296 Re-X. I repeat, had Mr. Hotchkiss ever informed you that he intended to waive his rights of reissue?

Ans. Mr. Hotchkiss never mentioned to me anything about a reissue, or waiving his right to a reissue, until my clocks were placed on the market.

297 Re-X. Then I am right, am I not, that Mr. Hotchkiss never informed you that he intended to waive his rights of reissue?

Ans. Mr. Hotchkiss never informed me of his waiving his right of reissue, or ever intimated to me that he intended to reissue, until after my clocks were placed on the market.

298 Re-X. You had opportunities to ask Mr. Hotchkiss if he intended to surrender that right, did you not?

Ans. I had opportunity to ask him.

209 Re-redirect:

299 Re-R. D. In your answer to 295th X interrogatory you say you had been led to believe by Mr. Hotchkiss' conversations that his patent covered, in his belief, the only possible way to make a cheap clock of that size. What was said by Mr. Hotchkiss to lead you into that belief?

Ans. In a conversation with Mr. Hotchkiss, shortly before Thanksgiving Day, 1880, he said that he had thought the matter over carefully and continually, and tried to study up some other way to make a cheap clock of this size, but had become satisfied that this was the only way in which it could be done and produce anything that could in any way compete with this clock.

300 Re-R. D. What way did he refer to?

Ans. He referred particularly to the use of the internal gear, no other part of the clock being mentioned at that time in this connection. This conversation was held on the third floor of the factory of the Yale Clock Co., within two weeks before Thanksgiving Day, 1880.

F. A. LANE.

Subscribed and sworn to before me this 29th day of December, 1880.

F. G. INGERSOLL,
Notary Public.

Adjourned to January 15th, 1883, at 10 o'clock a. m., same place.

210 NEW HAVEN, CONN., *January 15th*, 1883.

Met pursuant to adjournment.

Present: Parties as before.

JOHN E. EARLE, a witness produced by and on behalf of the defendant, being duly cautioned and sworn, to questions proposed by C. R. INGERSOLL, Esq., of counsel for defendant, answered as follows:

1st Int. What is your name, age, residence, and occupation?

Ans. John E. Earle; 51; New Haven, Conn.; patent solicitor.

2d Int. Have you had occasion, and, if so, to what extent, to examine inventions and the subject-matters of letters patent, and, in that connection, been called to testify heretofore as a mechanical expert in patent cases?

Ans. I have. For more than 30 years I have been engaged in soliciting patents, and up to 1863 in connection with mechanical drawing. Since 1863 my time has been devoted entirely to soliciting patents and investigations and business in connection therewith. Since January 1st, 1862, I have personally prepared more than 6,000 applications; have frequently been called upon to investigate the state of the art in connection with mechanical devices to ascertain whether or not patents granted for certain inventions were valid, in view of the state of the art; also to ascertain whether inventions were patentable. During the last fifteen years I have been called to testify as an expert in a large number of patent cases in the United States courts. I have also been called to act as arbitrator in several cases involving the scope and validity of letters patent.

211 3d Int. Are you familiar, and, if so, to what extent, with the art or mechanics of clock-making?

Ans. When I was 13 years old a copy of Reid's treatise on clock and watch making came into my hands, and, as a boy, I studied the clock as a piece of mechanism, and, with my father's consent, I took an old-fashioned wood time and strike movement and amused and instructed myself by taking it to pieces and putting it together, and during that year I cleaned and repaired several clocks, and desired to learn the watch and clock making trade. In the summer of the following year, when I was 14 and a half years old, I obtained a place in the watch and clock repairing shop of Mr. Champney, in Worcester, Mass. I was at once set to work cleaning and repairing clocks; was there, I think, two or three months. Then, on account of ill health, I was forced to leave and abandon that occupation, but have retained my interest in watches and clocks. During the last 20 years I have been several times called upon to examine the state of the art relating to clocks, and have prepared a large number of applications relating to time-keepers, and have been called upon to testify in suits based upon patents relating to clocks.

4th Int. Have you read, and do you understand, the reissued letters patent to Arthur E. Hotchkiss upon which this bill is brought, being letters patent No. 10062, dated March 14, 1882?

Ans. I have and I do.

5th Int. State particularly what you understand to be the improvements in clock mechanism described and claimed in those letters patent.

Ans. The invention relates to an improvement in mechan-
212 ism by which the power to drive the clock is imparted to the verge which operates the pendulum, commonly called a clock train. Such a clock train consists of a main or driving wheel, to which the power is applied; a crown wheel in connection with which the oscillating verge operates, and several wheels and pinions between the main wheel and crown wheel, the teeth of said wheels and pinions being proportioned to each other, so that a certain and predetermined number of vibrations will be imparted to the pendulum.

In such a clock train there is a shaft or arbor, which is called the center shaft, and which in a common, properly-regulated clock makes one revolution in each hour. This being the initial point of calculation, the size of the main wheel and all the wheels and pinions is calculated from this point.

On this center shaft is a pinion, into which one of the gears of the train meshes, to impart the required revolutions. This pinion is called the center pinion, because of its location on the center shaft.

On this center shaft is a gear wheel, one of the train, which is called the center wheel because of its location on the center shaft.

In the usual construction of such clock trains, long prior to the Hotchkiss invention and at the present time, the center pinion is rigidly connected to the center wheel, the wheel and pinion loose on the center shaft, but with a frictional connection therewith, so that the power applied to the pinion will cause the center shaft to revolve as if the pinion and wheel were rigidly attached to the shaft; but the center shaft is permitted to be rotated independent of the
213 wheel when occasion requires, as for setting or adjusting the pointers—the frictional connection between the center wheel and shaft permitting such independent rotation of the wheel and shaft.

Substantially, such a train is seen in Reid's Treatise, plate viii, and is also shown in the Exhibit "Comp'ts' Exhibit Grandfather's Clock Movement."

I also refer to a detached center shaft, with a center wheel and center pinion thereon, such as found in "Ex. Grandfather's Clock Movement," which I hold in my hand.

Def'ts' counsel puts in evidence the part last referred to by the witness, and it is marked "Def'ts' Ex. Common Center Shaft, F. G. Ingersoll, N. P."

The trains of watches and clocks are substantially alike, except that the watch train is provided with a wheel having a verge to operate directly into the crown wheel, or, as in some cases, an intermediate lever. When such a wheel is applied to a clock movement the movement is usually called a marine movement, because of its ability to run in any position, in contradistinction to a pendulum clock, which requires a rigidly fixed position.

The invention of Hotchkiss shows and describes a movement hav-

ing a fixed internal gear, with a disk carrying a toothed wheel at one side of its center, said toothed wheel meshing into the internal gear or rack, as it is called in the patent, whereby as the disk is revolved it carries with it the toothed wheel attached thereto—
214 that is, the toothed wheel revolves around the axis of the disk, and in so revolving with the disk, because of its connection with the feed rack, revolves on its own axis; and this wheel, so revolving, meshes into the pinion, and through such pinion imparts rotation to the remainder of the train.

This arrangement of stationary gear, revolving disc, and wheel, commonly called planet wheel, was a well-known device long prior to the Hotchkiss invention. It is to this class of movements that the Hotchkiss invention particularly relates. By such a construction the main wheel or revolving disc is made concentric with the center shaft, and the entire movement brought substantially within the circle of the diameter of the main wheel, and of which the center shaft is the center.

The train of gearing is driven by a main spring arranged in rear of the revolving disk. The outer end of the main spring is attached rigidly to the clock frame, the inner end fixed to the disk, so that when the disk revolves in one direction it coils or winds the main spring; then, if left free, the reaction of the main spring will turn the disk in the opposite direction, and in this latter case the power of the main spring is imparted to the train. As it would be impossible or impracticable to turn the entire movement backward when the spring was being wound, as it must do were there not some device to prevent it, the train of the movement is divided—that is to say, one portion of the train is independent to a certain extent of the remainder. Such a division must be made back of the center shaft—that is, between the center shaft and the power. I say must, because the hour pointer is attached to the center shaft, and, if the division were forward of the center shaft, the pointers would be turned backward in winding. In the Hotchkiss
215 invention the division is made between the center wheel and center pinion—that is to say, the center wheel and center pinion are independent of each other on the center shaft—that is, "disconnected" in contradistinction to being rigidly connected, as in the usual construction.

I hold in my hand a center shaft, center wheel, and center pinion, taken from the Hotchkiss movement for convenience of illustration.

Counsel for defendant puts in evidence the clock part referred to, and it is marked "Def'ts' Ex. Hotchkiss Center Shaft, F. G. Ingersoll, N. P."

It is in this division of the train that I understand the Hotchkiss invention to consist. This division, as described in the patent, is produced by arranging the center wheel upon the center shaft, with frictional connection therewith, substantially as and for the same purpose as in common clock movements.

The center pinion is loose upon the shaft and entirely independent of the center wheel and shaft when turned in one direction.

In connection with the pinion is a ratchet, and on the center wheel is a pawl standing in the path of the ratchet, and so that when the pinion revolves in one direction the teeth of the ratchet escape the pawl; when the pinion turns in the opposite direction the ratchet will engage the pawl. In the first case, the pinion revolves without effect upon the center wheel; in the latter case, the two revolve together.

216 The planet wheel of the movement meshes into the pinion, and, when in winding the clock the planet wheel necessarily revolves, it imparts its rotation to the pinion and turns it independent of that part of the train which is forward of the pinion; then, when the reactive power of the spring revolves the disk and planet wheel in the opposite direction, the ratchet on the center pinion engages the pawl on the center wheel and connects the forward part of the train with the power to drive it. The division of the train, then, is between the center wheel and center pinion. In carrying out this invention of the division of the train, the train is arranged in a frame composed of three plates—a front plate, a rear plate, and an intermediate plate. The plane of the intermediate plate is on a line substantially between the center wheel and center pinion, so that the rear division of the train stands between the rear and intermediate plates and the forward division of the train stands between the intermediate and front plates.

This intermediate plate forms what is called a bridge for the bearings of the shafts or arbors of the forward part of the train. For convenience of illustration I have caused to be made an enlarged model of the Hotchkiss movement, without the main spring or verge, showing the entire train and its division.

Def'ts' counsel puts in evidence the model referred to, and it is marked "Def'ts' Exhibit Enlarged Hotchkiss Train, F. G. Ingersoll, N. P."

217 Holding the model in the left hand, with the disk toward the right, then revolving the disk from the person, represents the winding movement in the Hotchkiss clock. In doing so it will be observed that the center pinion revolves in the same direction as the plate.

The outer end of the spring on the Hotchkiss movement is attached to the stationary part of the frame, the inner end to the hub of the disk, so that the rotation of the disk, as described, will wind the spring. The spring being wound and the hand which wound it removed, the reaction of the spring will cause the disk to revolve towards the person. This is illustrated by applying the power of the right hand to turn the disk, the hand then representing the reaction of the spring. In this operation it will be observed that the revolution of the center pinion is reversed, as well as of the disk. In the first illustration (that of winding) the pawl on the center wheel permits the center pinion to turn free and independent of the center wheel, and hence imparts no movement or effect to that part of the train forward of the center pinion; but in the last illustration (that of applying the power) the ratchet engages the pawl on

the center wheel and imparts the power to the forward part of the train, and the whole train in that condition operates substantially as if it were not divided.

This construction and arrangement of the center wheel and center pinion upon the center shaft, whereby "the train is divided into two parts between the center wheel and center pinion," and whereby the parts of the train of the movement are arranged between different plates and "disconnected," is fully described in the specification. Before summing up the invention the inventor in the specification recognizes the fact that the "frames of movements have been
218 made with three plates;" he also recognizes and admits that "the trains of movements have been divided," and that "parts of trains have been arranged between different plates, but not disconnected."

By these disclaimers I understand the inventor to recognize and admit that, so far as his train and its arrangement between three plates is concerned, his invention rests upon the one fact only that the parts of his train are "disconnected," in contradistinction to being connected, as in common clock trains. Without such division of the train or disconnection of the rear part from the front part the Hotchkiss clock would be useless.

Referring now to the summing up or claims of the Hotchkiss reissued patent, I understand the invention recited in the first claim to be for a train of a clock movement divided into two parts, the point of division being between the center wheel and center pinion arranged on the center arbor, each independent of the other; the arrangement being such that, when the pinion is turned in one direction, as for winding, it has no force or effect on the said center wheel, or that part of the train forward of it, but when turned in the opposite direction, as by the reaction of the spring, it will engage the center wheel and impart the power of the spring coming to it through the rear part of the train to the forward part of the train; and that this thus divided or two-part train is arranged in a frame composed of three plates parallel and connected together, the rear part of the train arranged between the rear and second or intermediate plate, and the forward part, or second division of the train, between the intermediate and third or front plates; or, in other words, that it is for what the inventor recites in his disclaimer—that is to say, a frame composed
219 of three plates; a train of gearing arranged so that a portion of it will stand between the rear and intermediate plates and the remainder between the intermediate and front plates where the train is divided between the center wheel and center pinion, and that this division of the train is the only novelty recited in the said first claim.

I understand the second claim to be for the same invention as that recited in the first claim, with the addition that the middle plate shall stand in a plane cutting the movement on the line of division—*i. e.*, between the center wheel and center pinion. The middle plate cannot divide the train in the sense of affecting the train. It is simply a partition in the movement to form rear bearings for the

arbors of those wheels of the front division of the train which are forward of the center wheel. To illustrate the statement that the partition, or middle plate, has no effect upon and cannot divide the train, I will suppose a room through which a shaft extends from end to end, with the power applied at one end to drive that shaft, with pulleys on the shaft to drive machinery extending along the floor beneath the shaft; now, set a partition across to divide the room into two parts; no effect is produced upon the power, shaft, or machinery driven. Again, instead of setting a partition across the room to divide it, suppose the shaft is separated at the center, one part provided with a rachet and the other with a pawl, or may be a common and well-known friction clutch, so that when the driven portion revolves in one direction it will impart its revolution to the other portion; or, throw out the clutch or pawl, the driven part will revolve independent of and without effect upon the other portion.

220 This would be a division of the mechanism by which the power was carried through the room, and would correspond, substantially, to the division of the train of the Hotchkiss clock. Now, set a partition across the room as before and at the point of the division in the shaft; it makes no further division in the shaft, nor does it affect it in the slightest degree; but it may be a great convenience in the arrangement of the machinery in the two compartments produced by the partition, and it is only in the sense of a partition between two compartments that this middle plate can constitute a division.

The third claim recites substantially the same combination, construction, and arrangement as that in the second claim, except that, whereas the second claim does not require that the entire train shall be arranged between the three plates, the third claim makes this qualification of the construction, that "the parts of the divided train (shall be) arranged between its three plates;" otherwise than this qualification the claims are identical.

The invention recited in the fourth claim is for a clock movement consisting of a frame composed of three plates, a center arbor provided with a center wheel and center pinion, the wheel arranged between the front and middle plates of the frame, and the pinion between the middle and back plates. If this claim means anything it is only ascertained by the closing words, "as set forth." The center pinion is not between the middle and back plates; neither is the wheel between the middle and front plates. There is no part or portion of middle plate between the center wheel and center pinion.

221 It is no more an arrangement of those two wheels on opposite sides of the middle plate than two persons standing in an open door and shaking hands over the threshold can be said to be on opposite sides of the partition.

As recited in the preceding claims, a division of the train is between the center wheel and center pinion, "as set forth" in the specification; and looking to the specification to learn what the word "arranged" in the claim means, I find that "the center arbor H extends through and turns in the front plate, * * * its back end turning on the hub G in the back plate C. The center

wheel E′ and the center pinion *e*, are arranged and are free to turn on the center arbor;" and the relative position of these two wheels to the middle plate —, as there stated, the one between the front and middle plates, and the other between the middle and back plates. The specification then goes on to describe the construction necessary for this loose arrangement on the center shaft of each of the wheels E and *e*. The plane in which the middle plate stands then is between this wheel and pinion, separated from each other, and so as to form the division set forth in the specification.

The invention recited in the fifth claim is for the same divided train—*i. e.*, the center arbor carrying the center wheel and center pinion, as before described—*i. e.*, "as set forth" in the specification—that part of the divided train forward of the center wheel being composed of three wheels and their pinions between the escape wheel and the wheel on the center arbor. I say wheel on the center arbor, because if the claim means strictly what it says, to wit, three wheels and their pinions between the escape wheel and the center arbor, then there is no such construction shown or described in the patent,

for between the center arbor and the escape wheel there are
222 four wheels—that is to say, one on the center arbor and the three intermediate wheels. I understand the "three wheels" referred to to be those between the center wheel and the escape wheel—that is to say, it is for a divided train, the division being between the center wheel and center pinion, and the forward part of the train consisting of a certain number of wheels and pinions.

I take into consideration the fact that in this fifth claim, as in the fourth, the division of the train is not particularly mentioned; but, as I understand it, the claim would have no force or effect were it not for the division of the train "as set forth," for the reason that the number of wheels and pinions in a train of clock gearing is simply a matter of convenience and mathematical calculation. There are no better established mathemetical rules than those for calculating trains of gearing—that is to say, having as the starting point the one revolution of the center shaft, given a certain number of teeth in the escape or crown wheel and a certain number of beats in the pendulum, the intermediate gearing between the center shaft and the crown wheel is a mere matter of calculation and convenience—it may be one, two, three, four, and so on *ad libitum*.

This claim, then, omitting as it does any reference to the three-plate frame, provides for the divided train, irrespective of the previous qualification requiring a three-plate frame.

The invention recited in the sixth claim is the same as that recited in the fifth claim, with this addition, that the three wheels of the forward part of the train, and next back of the escape wheel shall have the same number of teeth and be of the same diameter,

and that the arbors of the said three wheels shall have pinions
223 of the same diameter and of the same number of leaves, and that the pivots of the arbor shall be arranged in the circumference of a circle described from the center of the center arbor.

I observe that it is stated in the claim that those pivots are arranged "in the circumferences of circles;" this plural expression is

evidently a mistake, for the reason that there could be no possible arrangement of wheels in a train in which the pivots would not be in the circumferences of circles drawn from the center arbor as a center.

For illustration, suppose the center wheel to be, say, one foot from the crown wheel, and gears of two inches diameter arranged in a straight line drawn from the center shaft to the center of the crown wheel arbor, the pivot of each of those intermediate wheels would stand in the circumference of a circle drawn from the center shaft.

Hence it is that I say the plural expression "circumferences of circles" is evidently a mistake, and I find that Mr. Sheppard has the same understanding of this expression, as stated by him in his answer to his 4th int.

As in the fourth and fifth claims, the division of the train is not particularly expressed, but I understand, as in the previous claim, it is the necessary and unavoidable condition to that claim, and without it there could be no invention; for, as I have before stated, the number of wheels, the number of teeth in the wheels given, and the relative arrangement between two given points is a mere matter of calculation and convenience.

The seventh claim recites substantially the same invention as that recited in the fifth claim, with the addition that the pivots
224 of the three arbors and of the escape-wheel arbor shall be in a semicircle.

The inventor having recited in the sixth claim that the arrangement of the pivots of the three wheels is to be in the circumference of a circle of which the center arbor is the center, and in the seventh claim having added the pivot of the escape wheel, making four arbors in the same circle, I understand the seventh claim to fix only the position of the escape, in addition to the invention recited in the sixth claim. It is true that in this seventh claim the term "semicircle" is employed instead of the circumference of a circle; this would qualify the seventh claim to the extent that the four pivots must be arranged in one-half the circle, whereas the sixth claim would provide that they might extend over more than one-half the circle.

The eighth claim recites an invention substantially the same as the seventh claim, except as to the pivots being arranged "in a semicircle." The eighth claim requires that they shall be arranged "within a semicircle." By this expression, "within a semicircle," I understand that the pivots of the four wheels mentioned are to be arranged entirely at one side of a diametrical line drawn through the center arbor. This eighth claim further requires as an element of its combination a pendulum attached to an arbor near the top of the frame, and so as to vibrate in a plane between the front and middle plates.

6th Int. Referring to the first four claims of the patent, in each of which the element of "a frame consisting of three plates suitably connected together" is contained, state whether or not there would, in your opinion, be any invention in the arrangement of parts
225 described in either of those claims without the element of the

division of the trains, as you understand and have described it; please give the reasons for any opinion you may express.

Ans. There would not, for the reason that, before proceeding to point out what his invention is, the inventor specially disclaims the entire structure, except as to the disconnection of one part of the train from the other. He first disclaims the frame of a clock movement composed of three plates; he then disclaims trains of movements which have been arranged in frames composed of three plates, except where the parts of the train are "disconnected." All these elements—that is, clock movements having three-plate frames, trains arranged a part on one side of the middle plate and a part on the opposite side, and having the two parts connected so that there was no possible independence of the one part from the other—was well known to the art prior to the Hotchkiss invention. From this known state of the art, and from the acknowledgment of it made by the inventor in his specification, I answer, no.

Adjourned to Tuesday, Jan. 16th, 1883, 10 o'clock a. m., same place.

NEW HAVEN, CONN., *January 16th*, 1883.

Met pursuant to adjournment.

Present: Parties as before.

Examination of Mr. EARLE continued.

7th Int. What office is served by the plates which divide the space occupied by the clock movements into the several com-
226 partments in which such movements are commonly arranged?

Ans. To form bearings for one end of the arbors of a part of the train.

8th Int. Do they perform any function that affects the movement or operation of the train?

Ans. None whatever.

9th Int. In the complainants' or Hotchkiss clock is or not a division of such space by three plates a necessity of its peculiar movement gear?

Ans. It is, and must be in all movements of this character—that is to say, movements in which an internal toothed, stationary, circular rack is employed, and in connection with which the planet wheel is employed to impart or communicate the power to the train. In such a movement the planet wheel necessarily travels in a plane parallel with the movement, and so that, were the arbors extended through to the rear plate, they would interfere with the travel or rotation of the planet wheel. Hence it is that this intermediate plate is introduced into the Hotchkiss movement. The rear plate (if it may be so called) in the Hotchkiss clock is the revolving disk which carries the planet wheel. The diameter of that revolving disk is very much larger than the space bounded by the pivots of the arbors of the forward division of the train. The revolution of this disk would make it impossible to extend the arbors of the forward division of the train into the rear plate; the middle plate is,

therefore, necessary and essential to the Hotchkiss movement, and cannot, without material change in the movement, be dispensed with.

227 10th Int. In clock movements not containing the internal gear arrangement, like that in the Hotchkiss clock, is there any such necessity for the same division of space by three plates? And if you say there is not, please explain, particularly, why it is so.

Ans. There is not; as I have before stated the introduction of the intermediate plate into clock movements is, generally, for the purpose of shortening the arbors of a portion of the train, and, generally, it can be dispensed with by simply elongating the arbors of that portion of the train which has its bearings in the intermediate plate, and extending them to like bearings in the rear plate; for illustration I refer to a Hubbell movement (which I hold in my hand) and in which a plate is introduced between the front and rear plates to form bearings for the rear ends of the arbors of that portion of the train forward of the center wheel.

Def'ts' counsel puts the model referred to by the witness in evidence, and it is marked "Def'ts' Exhibit Hubbell Movement, F. G. Ingersoll, N. P."

It will be observed in this movement that if the intermediate plate were removed and the arbors elongated to take their bearing in the rear plate, the whole train would operate precisely as it does at present; this is the case in most of the three-plate frames; in some cases it might require some change in position of the arbors and their wheels of the forward part of the train, but this change of arrangement can be readily made without relative change of the wheels or pinions of that part of the train—*i. e.*, change as to size or number of teeth.

228 To illustrate this last statement I have caused a model to be made showing a change in a clock like "Comp'ts' Exhibit Def'ts' Clock," in which a portion of the intermediate plate is cut away and the arbor of the crown wheel and the arbor of the next wheel are extended and take their bearing in the rear plate, and in this model the pinion on the crown-wheel arbor and the next wheel are at the extreme rear—*i. e.*, in rear of the plane of the intermediate plate.

Def'ts' counsel puts the model referred to by the witness in evidence, and it is marked "Def'ts' Exhibit Earle Half Middle Plate, F. G. Ingersoll, N. P."

I have also prepared another model having the entire train like that in "Comp'ts' Exhibit Def'ts' Clock," with the intermediate plate entirely cut away and all the arbors extended to and taking their bearing in the rear plate; in making this model it is necessary, as I have heretofore mentioned, to change the position of the arbors and wheels somewhat, but without changing their relation to each other as to size or number of teeth, and in making this change it will be observed that the train occupies considerably less area than the train in "Complainants' Exhibit Defendants' Clock."

The only advantage, then, of an intermediate plate in a clock train of common character is to shorten the arbors.

Def'ts' counsel puts the model referred to by the witness in evidence, and it is marked "Def'ts' Exhibit Earle No Middle Plate, F. G. Ingersoll, N. P."

229 There is another class of three-plate clocks, in which the train is, substantially, a common clock train, and in which, in order to contract the space occupied by the movement, the main wheel and a portion of the train is arranged in rear of an intermediate plate, and the forward portion of the train between the intermediate and front plates. In this class of clocks a part of the intermediate plate is necessary, or rather convenient, to form bearings for the rear ends of the arbors of a portion of the train, because it would be inconvenient or interfere somewhat with the arrangement of the train were the arbors extended through to the rear plate. This is the construction of the Davies patent, No. 202,795, and dated April 23d, 1878.

Defendants' counsel puts the patent referred to in evidence, and it is marked "Def'ts' Exhibit Davies Patent, F. G. Ingersoll, N. P."

11th Int. What knowledge have you of movements like the movement "Def'ts' Ex. Hubbell Movement" prior to 1879?

Ans. Mr. Laporte Hubbell brought to me, prior to 1866, a model having this bridge, or intermediate plate, to prepare an application for letters patent, which I did, and the patent was issued Nov. 28th, 1865—No. 51184.

In the illustration in the patent the upper portion of the rear plate is dispensed with—*i. e.*, that part which is, or would be, in rear of the upper or forward part of the train—whereas in the "Ex. Hubbell Movement" the rear and front plates are of the same size and extent. But I would here remark that the upper
230 portion of the rear plate of the Hubbell movement, as in "Comp'ts' Ex. Def'ts' Clock," is of no use or effect, so far as the forward part of the train is concerned, and might be cut away, as in the illustration in the Hubbell patent. I have a model like the illustration in the Hubbell patent, and it is, I believe, the movement from which the drawings for that application were prepared, and which has been in my possession ever since.

Def'ts' counsel puts in evidence the model last referred to, and it is marked "Def'ts' Ex. Hubbell Movement No. 2, F. G. Ingersoll, N. P."

12th Int. Referring now to the 5th, 6th, 7th, and 8th claims of the patent upon which this bill is brought, in each of which claims I understand you to find that the three wheels between the center wheel and the escape wheel, as described, to be an element, state whether or not, in your opinion, either of those claims contains anything of patentable invention, unless the division of the train, as described by you, is regarded as a necessary element of the arrangement of parts therein set forth.

Ans. No, sir. As I have already stated, the number of wheels and pinions in a train is simply a question of mechanical convenience and mathematical calculation.

That is to say, given the initial velocity of the center shaft, the number of teeth in the escape wheel, and the number of vibrations of the pendulum, the intermediate wheels of the train, whereby the initial or one revolution of the center shaft will impart to the
231 crown or escape wheel the required number of revolutions, may vary from a single wheel on the center shaft, working directly into the pinion of the crown wheel, to any desired unlimited number of wheels and pinions.

The rules for calculating the trains are found in Reid's Treatise, which I have before referred to, with a large number of examples, and with tables giving the diameters and number of teeth of wheels in clock trains which, with the length of the pendulum given, will produce a certain number of vibrations. These wheels are of various numbers of teeth; in one case three wheels have the same number of teeth and their pinions the same number of leaves.

After having gone fully into the subject of the relative size of wheels and pinions to produce a certain result, and given extensive tables for convenient reference to avoid mathematical calculation, immediately following the table, on page 159, the author states:

"Should there be any trains required which are not in the tables, the artist can supply this by having recourse to the method which has been given to find numbers for wheel teeth," &c.

On page 156, immediately preceding the tables, the author says:

"The table which we are about to give, containing different lengths of pendulums, the number of their vibrations in a minute, and the numbers for the teeth of the wheels and pinions to produce the vibrations, will be found very useful and convenient for the clock-maker, who, having determined on his height of case
232 or length of pendulum, has only to inspect the table to find what his wheels and pinions should be, which will save a great deal of trouble.

"For the like reason is added a table of various trains of watches and chronometers, and the number of their wheels and pinions calculated to produce them, and which may be useful to many a watchmaker and watch-movement maker." The date of publication of my copy of Reid's Treatise is 1826.

Counsel for complainant objects to Reid's Treatise and all extracts therefrom for any purpose of anticipation, there being no notice in the answer.

13th Int. If you can illustrate the subject of your last answer by any models that you have prepared for that purpose please do so.

Ans. First, as to the fifth claim—that is, three wheels and pinions between the center wheel and crown wheel—I offer a model showing such a train of three wheels between the center and crown wheel, and arranged upon a plate for convenience of inspection, the relative size of wheels and pinions being the same as described in the

Hotchkiss reissued patent, and whereby one revolution of the center wheel will impart two hundred and eight revolutions to the crown wheel.

Counsel for defendant- puts model referred to by the witness in evidence, and it is marked "Earle Model Five-Wheel Train. No. 1. F. G. Ingersoll, N. P."

233 In this exhibit the three wheels between the center wheel and crown wheel have the same number of teeth, and the pinions also the same number of leaves.

Now, to illustrate my statement that the diameters of wheels, pinions, and the number of teeth and leaves to produce the same result is simply a matter of mathematical calculation, I have caused a model to be made having five wheels, as in the "Exhibit Five-Wheel Train." In this model the center wheel has thirty-one teeth; the next wheel—*i. e.*, the first of the three intermediate wheels, has thirty-two teeth and carries a pinion of nine leaves; the next or second wheel has thirty teeth and carries a pinion of eight leaves; the next or third wheel has twenty-four teeth and carries a pinion of six leaves; the said third wheel works into a pinion on the crown wheel arbor of eight teeth.

This train may be thus stated:

$$31 - 9 = 32 - 8 = 30 - 6 = 24 - 8.$$

The result is that one revolution of the center wheel produces two hundred and six and a fraction revolutions of the escape wheel. This is a fraction less than in the "Ex. Five-Wheel Train, No. 1," but such slight variations are immaterial in a clock train. It may be a little more or less. The difference is compensated for by adjusting the ball of the pendulum; if it be a little less the pendulum must be lengthened; if it be greater the pendulum must be shortened.

Def'ts' counsel puts the model last referred to in evidence, and it is marked "Def'ts' Exhibit Earle Model Five-Wheel Train, No. 2, F. G. Ingersoll, N. P."

234 I have also had made under my direction another model exhibiting a train consisting of a center wheel, a crown wheel, and three intermediate wheels—that is, the same number of wheels as in the last two exhibits, but differing as to the number of teeth in the wheels and leaves in the pinions. The relation of the wheels in this train may be thus stated:

$$24 - 8 = 31 - 9 = 30 - 6 = 32 - 8.$$

This train produces the same result as in the last "Exhibit No. 2."

Def'ts' counsel puts the model last referred to in evidence, and it is marked "Def'ts' Exhibit Earle Model Five Wheel-Train, No. 3. F. G. Ingeesoll, N. P."

I have also caused to be made a model showing a center wheel and

Ans. No, sir. As I have already stated, the number of wheels and pinions in a train is simply a question of mechanical convenience and mathematical calculation.

That is to say, given the initial velocity of the center shaft, the number of teeth in the escape wheel, and the number of vibrations of the pendulum, the intermediate wheels of the train, whereby the initial or one revolution of the center shaft will impart to the
231 crown or escape wheel the required number of revolutions, may vary from a single wheel on the center shaft, working directly into the pinion of the crown wheel, to any desired unlimited number of wheels and pinions.

The rules for calculating the trains are found in Reid's Treatise, which I have before referred to, with a large number of examples, and with tables giving the diameters and number of teeth of wheels in clock trains which, with the length of the pendulum given, will produce a certain number of vibrations. These wheels are of various numbers of teeth; in one case three wheels have the same number of teeth and their pinions the same number of leaves.

After having gone fully into the subject of the relative size of wheels and pinions to produce a certain result, and given extensive tables for convenient reference to avoid mathematical calculation, immediately following the table, on page 159, the author states:

"Should there be any trains required which are not in the tables, the artist can supply this by having recourse to the method which has been given to find numbers for wheel teeth," &c.

On page 156, immediately preceding the tables, the author says:

"The table which we are about to give, containing different lengths of pendulums, the number of their vibrations in a minute, and the numbers for the teeth of the wheels and pinions to produce the vibrations, will be found very useful and convenient for the clock-maker, who, having determined on his height of case
232 or length of pendulum, has only to inspect the table to find what his wheels and pinions should be, which will save a great deal of trouble.

"For the like reason is added a table of various trains of watches and chronometers, and the number of their wheels and pinions calculated to produce them, and which may be useful to many a watchmaker and watch-movement maker." The date of publication of my copy of Reid's Treatise is 1826.

Counsel for complainant objects to Reid's Treatise and all extracts therefrom for any purpose of anticipation, there being no notice in the answer.

13th Int. If you can illustrate the subject of your last answer by any models that you have prepared for that purpose please do so.

Ans. First, as to the fifth claim—that is, three wheels and pinions between the center wheel and crown wheel—I offer a model showing such a train of three wheels between the center and crown wheel, and arranged upon a plate for convenience of inspection, the relative size of wheels and pinions being the same as described in the

Hotchkiss reissued patent, and whereby one revolution of the center wheel will impart two hundred and eight revolutions to the crown wheel.

Counsel for defendant- puts model referred to by the witness in evidence, and it is marked "Earle Model Five-Wheel Train. No. 1. F. G. Ingersoll, N. P."

233 In this exhibit the three wheels between the center wheel and crown wheel have the same number of teeth, and the pinions also the same number of leaves.

Now, to illustrate my statement that the diameters of wheels, pinions, and the number of teeth and leaves to produce the same result is simply a matter of mathematical calculation, I have caused a model to be made having five wheels, as in the "Exhibit Five-Wheel Train." In this model the center wheel has thirty-one teeth; the next wheel—*i. e.*, the first of the three intermediate wheels, has thirty-two teeth and carries a pinion of nine leaves; the next or second wheel has thirty teeth and carries a pinion of eight leaves; the next or third wheel has twenty-four teeth and carries a pinion of six leaves; the said third wheel works into a pinion on the crown wheel arbor of eight teeth.

This train may be thus stated:

$$31 - 9 = 32 - 8 = 30 - 6 = 24 - 8.$$

The result is that one revolution of the center wheel produces two hundred and six and a fraction revolutions of the escape wheel. This is a fraction less than in the "Ex. Five-Wheel Train, No. 1," but such slight variations are immaterial in a clock train. It may be a little more or less. The difference is compensated for by adjusting the ball of the pendulum; if it be a little less the pendulum must be lengthened; if it be greater the pendulum must be shortened.

Def'ts' counsel puts the model last referred to in evidence, and it is marked "Def'ts' Exhibit Earle Model Five-Wheel Train, No. 2, F. G. Ingersoll, N. P."

234 I have also had made under my direction another model exhibiting a train consisting of a center wheel, a crown wheel, and three intermediate wheels—that is, the same number of wheels as in the last two exhibits, but differing as to the number of teeth in the wheels and leaves in the pinions. The relation of the wheels in this train may be thus stated:

$$24 - 8 = 31 - 9 = 30 - 6 = 32 - 8.$$

This train produces the same result as in the last "Exhibit No. 2."

Def'ts' counsel puts the model last referred to in evidence, and it is marked "Def'ts' Exhibit Earle Model Five Wheel-Train, No. 3. F. G. Ingeesoll, N. P."

I have also caused to be made a model showing a center wheel and

crown wheel with two intermediate wheels and pinions, making a train of four wheels. In this case the center wheel has forty-two teeth; the next or first wheel has thirty-six teeth (the center wheel working into a pinion on the arbor of the second wheel, which has six leaves); the next, or second, wheel has thirty teeth, with a pinion of six leaves on its arbor (and the second wheel works into a pinion of six leaves on the crown wheel arbor); the result from this train is two hundred and ten revolutions of the crown wheel to one revolution of the center wheel.

Def'ts' counsel puts the model last referred to in evidence, and it is marked "Def'ts' Exhibit Earle Model Four-Wheel Train, F. G. Ingersoll, N. P."

235 The statement of this train is—

$$42 - 6 = 36 - 6 = 30 - 6.$$

I have caused to be made another model showing a train of a center wheel, a crown wheel with four intermediate wheels and pinions, making a train of six wheels, the center wheel having twenty-seven teeth, the pinion on the crown-wheel arbor ten leaves.

The statement of this train is—

$$27 - 7 = 24 - 8 = 24 - 8 = 24 - 8 = 20 - 10.$$

The result of this train is two hundred and eight revolutions of the crown wheel to one of the center wheel.

Def'ts' counsel puts the model last referred to in evidence, and it is marked "Def'ts' Ex. Earle Model, Six-Wheel Train, F. G. Ingersoll, N. P."

As a further illustration, I produce a clock which shows one wheel and pinion between the center wheel and crown wheel, making a train from the center wheel to the crown wheel, inclusive, of three wheels.

Def'ts' counsel puts the clock referred to by witness in evidence, and it is marked "Def'ts' Exhibit German Clock, Three-Wheel Train, F. G. Ingersoll, N. P."

I produce a clock movement, consisting of a train of four wheels and pinions between the center wheel and the arbor, which
236 imparts movement to the pendulum. This movement is different from any movement to which I have before referred from the fact that the pendulum is caused to swing in a circle, the plane of the circle at right angles to the pendulum rod. It is a style of movement well known many years ago. The train stands in a horizontal position—*i. e.*, the arbors are vertical; the dial is arranged in a vertical plane—*i. e.*, a plane at right angles to the axis of the center shaft, which necessitates one intermediate wheel between the time wheel and a pinion on the center shaft, in order to convert the horizontal rotation of the center shaft into the vertical rotation required for the pointers.

This is another illustration of what may be called a six-wheel train, including the center wheel and crown pinion. The crown wheel in the movement is a single radially-projecting arm.

Def'ts' counsel puts the clock movement last referred to in evidence, and it is marked "Def'ts' Exhibit Brown Clock, F. G. Ingersoll, N. P."

From these illustrations I show that the number of wheels in a train to produce a certain number of revolutions from one initial center is simply a matter of convenience and mathematical calculation, and the illustration might be continued to an unlimited extent as to number of wheels and pinions, or number of teeth and leaves in such wheels and pinions.

The sixth claim of the reissued patent provides that the pivots of the intermediate wheels between the center wheel and the escape wheel shall be arranged in the circumference of a circle concentric with the center arbor.

237 Reference to "Exhibits Earle Five-Wheel Train, Nos. 1, 2, and 3," and "Def'ts' Ex. No Middle Plate," shows three wheels intermediate between the center and crown wheel, and in which the centers of the arbors are not in the circumference of a circle concentric with the certer arbors. As a further illustration that such an arrangement of the arbors is immaterial, if not accidental, I have caused a change to be made in a movement like "Comp'ts' Ex. Def'ts' Clock," whereby the position of the arbors of the three intermediate wheels has been changed with relation to the center shaft, which model I here produce.

Def'ts' counsel puts the model last referred to by the witness in evidence, and it is marked "Def'ts' Exhibit Def'ts' Clock, Rearranged Pivots, F. G. Ingersoll, N. P."

The open holes in the plates are the bearings where the pivots originally stood. The holes where the pivots now are show the rearrangement, and which brings the three pivots into the circumference of a circle eccentric to the center shaft This illustration shows that any particular arrangement of the pivots of the wheels with relation to the center shaft is immaterial, and this is further illustrated by the several exhibit movements.

For the same reasons that I say the arrangement of the wheels is immaterial and may be accidental or for convenience, the semi-circular arrangement of the pivots described in the seventh claim cannot constitute invention.

For the same reason the "within a semicircle" arrangement of the pivots described in the eighth claim cannot constitute invention.

238 If the semicircular arrangement of the pivots of the three wheels does not mean the circle described in the reissued patent as concentric with the center shaft it can mean nothing, from the fact that, unless the three pivots are in a straight line, they must be in a circle having a center somewhere.

14th Int. Referring now to the five "Earle Models" introduced by you, state whether the movement shown in any of them, and, if so, which, can be substituted for the movements in the complainants' or Hotchkiss clock without altering the result.

Ans. Either of the trains in the said five exhibits could be placed in the Hotchkiss clock without changing the result.

15th Int. And how would the spaces occupied by them, respectively, on such substitution correspond with the space occupied by the actual Hotchkiss movement?

Ans. With the three "Five-Wheel Trains, Ex. 1, 2, and 2," there would be very little difference. In regard to the six-wheel train, that covers a little greater area, but will readily come within the circumference of the circular rack. With "Exhibit Four-Wheel Train" the space occupied would be much less.

16th Int. In describing a Hotchkiss clock you have referred to three plates as the front, middle, and rear plates; indicate the plates that you mean by that designation.

Ans. I have used the expression "three plates" because of that expression in the reissued patent.

The three plates thus referred to are the front plate—the plate next in rear of it and which forms the rear bearings for the forward part or division of the train—the third plate, if any there be, must be the circular rack. The disk which revolves within that
239 rack is practically the main wheel, which communicates the power to the center pinion, loose on the shaft. There is a plate which forms the back of the circular rack, and which is rigidly attached to the rack, which serves as a means for securing the movement to the back of the clock, and the arm on that plate which extends into the back forms the front wall of the spring chamber, the back of the clock forming the rear wall of the chamber. This metal back of the rack is described as the third plate. I think the two front plates, which support the forward part of the division of the train and the rack with its back constitute the third plate. I say "the rack with its back" for the reason that the rack is practically a permanent part of that plate, and that it is by means of that rack that the back plate is connected to the intermediate plate.

17th Int. Is there, then, another plate to the rear of the sheet-iron back plate that you call the rear plate?

Ans. There is, to wit, the back of the clock, and without which the mechanism contained in the remainder of the frame would be practically useless. The back is of sheet brass strengthened by a flange around its edge turned forward.

18th Int. Have you examined, so as to be familiar with, the mechanism and its arrangement of the clock shown in "Complainants' Exhibit Defendants' Clock?"

Ans. I have.

19th Int. Please compare that clock and its several parts and their movement and operation with the improvements described and claimed in the patent upon which this bill is brought, and state whether you find any resemblances therein (pointing out par-
240 ticularly what they are, if you find any), and say whether you

find embodied in the defendant's clock any of the improvements described and claimed in the patent.

Ans. The defendant's clock is a movement of a different class from that shown and described in complainants' reissued patent. Instead of the stationary rack, revolving disk, and planet wheel, by which, in the Hotchkiss clock, the power of the main spring is communicated to the train, the main wheel in defendant's clock is arranged upon an arbor eccentric to the center shaft, and its teeth work directly into the center pinion substantially, and I may say identically, as it does in the common and well-known movement, such as seen in "Complainants' Exhibit Grandfather's Clock." In the Hotchkiss clock the main spring is attached by its outer end rigidly to the frame, and by its inner end to the hub of the main wheel—that is, the revolving disk which carries the planet wheel. In defendant's clock the outer end of the main spring is attached rigidly to the frame; the inner end is attached to the main-wheel arbor, the main wheel being loose on that arbor so that the key applied to the arbor of the main wheel will wind the spring. On the shaft of the main wheel is a toothed ratchet, and on the main wheel is a pawl, and so that as the shaft and ratchet are turned in one direction to wind the spring the teeth of the ratchet escape from the pawl, and so that the shaft may revolve free and independent of the main wheel or any part of the train forward of the main wheel; but, when the power applied to the shaft of the main wheel to wind the main spring is removed, the reaction of the spring tends to turn the shaft in the opposite direction, but, in turning in such opposite direction, a tooth of the ratchet engages the pawl and connects
241 the shaft with the main wheel, so that the reactive power is applied directly to the main wheel, and from the main wheel this power is communicated directly to the train in a common and well-known manner, and as illustrated in "Exhibit Grandfather's Clock."

For convenience of illustration I have detached the main wheel and its shaft from one of defendant's clocks. Holding the wheel in the left hand, with the longer portion of the shaft toward the right, and with the ratchet on the left-hand side of the wheel, the operation of winding will be illustrated by taking hold of the projecting shaft with the thumb and finger of the right hand and turning the shaft towards the person, which is the direction turned in winding the spring.

It will be observed that the teeth of the ratchet escape from the pawl so that the shaft and ratchet turn independent of, and without effect upon, the main wheel.

Now, reverse the action of the right hand; a tooth of the ratchet will engage the pawl and connect the shaft and main wheel as if the wheel were rigidly attached to the shaft.

Def'ts' counsel puts the main wheel and shaft referred to by the witness in evidence, and it is marked "Defendants' Exhibit Defendants' Main Wheel, F. G. Ingersoll, N. P."

Adjourned to Wednesday, January 17th, 1883, at 10 o'clock a. m., same place.

242 NEW HAVEN, CONN., *January 17th*, 1883.

Met pursuant to adjournment.

Present: Parties as before.

Mr. Earle continues his answer to the 19th interrogatory:

The first essential difference, then, which I find between the Hotchkiss clock and the defendant's clock is, that whereas the main wheel in the Hotchkiss clock must be rotated in one direction in winding the main spring and in the opposite direction to impart the power of the spring to the train, in the defendant's clock the main wheel is detached (or disconnected) from the main spring so that it does not revolve when the main spring is being wound; but, after the main spring is wound, connection is made between the main spring and the main wheel, whereby the power of the spring is imparted to the train.

The main wheel in defendant's clock works directly into the center pinion—that is, the pinion on the center shaft, instead of through an intermediate or planet wheel, as in the Hotchkiss clock.

This constitutes the second point of difference.

And from it follows the next difference, which is the stationary, internally-toothed circular rack, concentric with the center wheel, whereby the revolution of the center wheel produces the revolution of the planet wheel on its own axes. In defendant's clock no such construction, arrangement, or device is found; but the main wheel in defendant's clock, instead of being concentric with the center shaft, as necessary to the Hotchkiss clock, has its axis distant from the center shaft, so as to bring the periphery or teeth of the
243 main wheel into direct engagement with the pinion on the center shaft, and, as in a common and well-known arrangement of the main wheel and spring, in relation to the center shaft.

The next and essential point of difference is in the center pinion, center wheel, and center shaft. In defendant's clock the center wheel and pinion are rigidly connected, as if made in one piece, and are arranged upon the shaft with a frictional connection so strong that, when the power is applied to the pinion, it will cause the shaft to turn with it, but will permit the shaft to be turned independent of the wheel and pinion for the adjustment of the pointers in the usual and well-known manner. The center shaft, center wheel, and pinion of defendant's clock does not differ from the common and well-known construction and arrangement, such, for instance, as the center shaft of the "Hubbell movement," or the center shaft of "Exhibit German Clock Three-wheel Train," and "Defendants' Exhibit Common Center Shaft." I hold in my hand a center shaft, center wheel, and pinion detached from defendant's clock.

Defendants' counsel puts the center shaft last referred to by the witness in evidence; and it is marked "Defendants' Exhibit Defendants' Center Shaft, F. G. Ingersoll, N. P."

In the Hotchkiss clock, owing to the fact that the main wheel must revolve backward in winding, it is necessary to disconnect one part of the train from another at some point back of the escape

244 wheel, and, in order to prevent the backward turning of the train wheel from operating upon the center shaft so as to turn the pointer backward, a disconnection or division of the train is made between the center wheel and center pinion, the center pinion being loose on the shaft and entirely independent both of the shaft and center wheel in the backward turning of the main wheel, so that when the main wheel is turned backward, as in winding, the pinion will turn free upon the center shaft without possible force or effect upon the center shaft, center wheel, or any part of the train forward of the center shaft.

To apply the power of the main spring after it has been thus wound an automatic engagement is made between the pinion and center wheel whereby, when the main wheel revolves in a forward direction, it will impart the power of the spring to the forward portion of the train.

It is this peculiar arrangement of the center wheel and center pinion on the center shaft that shows the essential difference between the Hotchkiss clock and the defendant's clock as well as between the Hotchkiss clock and the clocks in common and general use long prior to the invention of the Hotchkiss—such, for instance, as the "Ex. Hubbell Movement" and "Ex. Grandfather's Clock."

In the Hotchkiss clock it is positively necessary that the forward part of the train shall be "disconnected" from the back portion.

(I use the term "forward part" as being between the center wheel and crown wheel, and the back part as being between the center wheel and main wheel.)

Without such a disconnection and division of the train it would be impossible, practically, to wind the Hotchkiss clock,
245 and the division must be such that the wheels of the back part of the train may be turned backward with perfect freedom and independence of the forward part of the train.

In defendant's clock there is no division of the train; all the wheels of the train (from and including the main wheel to and including the crown wheel) have and can have but one movement, and that directly forward. A division in the train of defendant's clock, as in the Hotchkiss clock, would be useless and without any possible effect upon the clock; that is to say, for illustration, take the center wheel and center pinion, with the pawl and ratchet arrangement, from the Hotchkiss clock, and arrange them upon the center shaft of defendant's clock, or of any other common clock train with which they would mesh, and the division which exists between the pinion and center wheel would have no effect upon the train. Now, take the center wheel and pinion from defendant's clock, or from any other common clock train which would mesh with the Hotchkiss train, and place that center wheel and pinion upon the center shaft of the Hotchkiss clock, and the movement is at once rendered inoperative and useless; the main spring cannot be wound in the usual manner, and consequently cannot act to drive the train.

In the Hotchkiss clock then the division of the train between the center wheel and center pinion is necessary, and without it the clock

would be useless, whereas the division of the train in defendant's clock would be useless, and does not in fact exist in that clock. The whole train of defendant's clock, from the main wheel to the crown wheel, does not differ from any of the common clock trains well known prior to the date of the Hotchkiss patent, whereas the
246 whole train of the Hotchkiss is essentially different from any clock train of which I am aware as having existed prior to its invention by Hotchkiss.

This essential difference is in the division of the train, resulting from applying the main spring directly to the main wheel, as I have before described.

The inventor, at the close of his specification, and before he proceeds to sum up in the form of claims, disclaims precisely defendant's clock; that disclaimer, thus applied, would read thus: "I am aware that * * * parts of trains have been arranged between different plates," connected as in defendant's clock, "but not disconnected," as in the Hotchkiss clock.

The disclaimer, had it been written with the words I have introduced added, would not have changed in the slightest degree its description of the state of the art, and as it stands could not, without referring by name to the particular thing, have better disclaimed the defendant's clock. The term "but not disconnected," as referring to the two parts of the train which are arranged between different plates, indicates as clearly as language can do it that the only difference between trains thus arranged is that Hotchkiss has disconnected the parts of the train which were before connected, and herein lies his invention, and in my opinion, in view of the state of the art at the time of the invention of Hotchkiss, that division of the train was all there was left for him to invent.

In the first claim an essential element or feature of construction is that the train shall be "divided into two parts * * *" and that "the point of division being (shall be) between the center wheel and center pinion." No such division exists in the
247 defendant's clock, and does exist in and is necessary to the Hotchkiss clock.

The second claim calls for the arrangement of the middle plate to stand on a line or plane between the center wheel and center pinion, as set forth.

The center pinion and center wheel must be disconnected the one from the other, or it is not the center wheel and center pinion of the clock movement shown and described in the Hotchkiss patent; and, as there is no such disconnection between the center wheel and center pinion in defendant's clock, it necessarily follows that the defendant's clock does not and cannot embody the invention recited in the second claim.

It would be impossible to extend the middle plate in defendant's clock between the center pinion and center wheel. There is no part of the intermediate plate in rear of the center wheel or in front of the center pinion. The plane of the front surface of the intermediate plate is substantially, not to say identically, in the same plane with the rear surface of the center wheel.

For the same reasons defendant's clock does not and cannot employ the invention recited, if any there be, in the 3d and 4th claims.

The 5th claim leaves out the intermediate plate as an element and introduces three wheels and pinions between the center wheel, which forms the first wheel for the forward division, and the crown wheel, which forms the fifth wheel for the forward division.

As in regard to the previous claims, there being no division or disconnection of the center wheel and center pinion, I do not
248 find in defendant's clock the invention, if any there be, in the said fifth claim.

I take into consideration the fact that there are the same number of wheels in defendant's train, from center wheel to crown wheel, as in the Hotchkiss clock, but the number of the wheels in the train cannot in itself qualify the claim, for, so far as the train is concerned, it is immaterial how many wheels there are, more or less, — is a well-known mechanical expedient for convenience.

The 6th claim contains, to all intents and purposes, the same essential features as the preceding claims—that is, the divided train.

For that same reason defendant's clock does not employ the invention therein recited, if any there be.

I take into consideration the fact that the claim calls for the arrangement of the three wheels in the circumference of a circle concentric with the center shaft. It being common to arrange shafts of a clock train in various positions in relation to the center shaft, there can be no invention in any particular arrangement of those pivots in relation to the center shaft.

The result cannot be changed by changing the position. It is the same train irrespective of the position of the pivots with relation to the center shaft; but, aside from this fact, the pivots of the three intermediate wheels of defendant's clock are not concentric with the center shaft—that is to say, they are not in the circumference of a circle drawn from the center of the center shaft, so that, aside from the division of the train, defendant's clock has not the pivots arranged as described in the said sixth claim.

For the reason heretofore given concerning the sixth and
249 preceding claims, defendant's clock does not employ the invention recited in the seventh claim.

I take into consideration the fact that the seventh claim brings the pivot of the escape wheel into the same concentric circle as the pivot of the three intermediate wheels, but this arrangement of the four pivots is not found in defendant's clock. The four pivots of defendant's clock are not in a circle concentric with the center shaft.

For the same reasons before stated in regard to the preceding claims defendant's clock does not employ the invention recited in the eighth claim.

I take into consideration the fact that the claim describes the train as "arranged within a semicircle;" this must mean the same semicircle as described in the seventh claim, and which is a part of the same circle described in the sixth claim.

In defendant's clock there is no such arrangement of pivots.

20th Int. Please look at the clock now shown to you and describe its parts.

Def'ts' counsel puts in evidence the clock shown to witness, and it is marked "Def'ts' Ex. Everitt Clock. F. G. Ingersoll, N. P."

Proof [of] the same is to be made hereafter.

Ans. This movement is a combined alarm and time movement, and of that class in which a single main spring drives both
250 the time and alarm. The main spring is arranged substantially concentric with the center shaft—*i. e.*, the center shaft is in axial line with the main shaft. The inner end of the main spring is attached to the main shaft and the outer end is atached to the center wheel, which is concentric with the main shaft. The center wheel is toward the front plate or in front of the main spring. The alarm wheel is in rear of the main spring. The pawl and ratchet, by which the turning of the main shaft is permitted, is between the alarm wheel and center shaft.

When the movement is running as simply a time movement the alarm wheel and main shaft are stationary.

The center wheel and center shaft are caused to revolve by the reaction of the main spring through the connection of its outer end with the center wheel.

Between the center wheel and the crown or escape wheel are three wheels on arbors carrying pinions.

The center wheel works into the pinion of the first wheel, the first into the pinion of the second wheel, and the third into the pinion of the escape wheel.

The entire train, including the center and escape wheel, is composed of five wheels.

On the center shaft is a cam wheel which revolves with it, and which at a predetermined time releases the alarm part and permits that to operate to sound the alarm in a common and well-known manner.

Now, placing this movement in the case and applying the pointer to the center shaft, I find that the center shaft makes one
251 revolution in twelve hours, and that the single pointer attached to the center shaft travels around the dial and indicates the hours by figures in the usual arrangement on the dial and by points or divisions between the hours will indicate quarters of an hour.

The usual minute hand is dispensed with; hence the necessity of making the center shaft to revolve once every twelve hours.

Immediately in rear of the dial plate is a disk having upon its surface two series of figures—one series Roman and the other Arabic.

In the dial plate is a series of openings corresponding to the usual hour marks of a clock dial.

The disk having the two series of figures is arranged so as to have a partial rotation, the rotation being given to it by means of a finger projecting from the edge of the disk through a slot in the top of the case. The slot determines the extent of rotation of the disk.

When the disk is turned to the extreme right the Roman figures

are presented to the respective openings in the dial, but when turned to the opposite extreme the Arabic figures are presented to the respective openings in the dial.

Between the disk and the alarm verge a device is introduced, operated by the disk, so that when the disk is turned to the right and presents the Roman figures of the dial the alarm is cut off and the movement becomes simply a time movement, what is commonly known as at least a thirty-hour movement—that is, a movement which will certainly run twenty-four hours without winding.

But when the disk is turned to the extreme left, to present the Arabic figures on the dial, then the alarm is free and will go off at the time when set—as for illustration, supposing it be nine
252 o'clock in the evening, and the person for whose benefit the alarm is to be used desires to be wakened at 8.45 the next morning, the alarm wheel on the dial will be turned to bring that eight and three-quarters in line with the pointer and the disk turned to the left to present the Arabic numerals on the dial. The clock will now run like any common clock until 8.45; the cam in rear of the dial will release the alarm mechanism; then the power of the main spring will cause the vibration of the hammer and the sounding of the alarm, and the alarm will continue until the spring be run down, unless the person interrupt it by turning the dial or alarm cone.

There being but a single pointer on the center shaft, the usual time gears employed where two pointers are used are unnecessary—that is, where two pointers are used, as in the usual construction, one pointer is fixed to and moves with the center shaft; the other by intermediate gears moves usually as 1–12, because a center shaft carries the minute pointer. But if the center shaft carries the hour pointer, as in the "Ex. Everitt Clock," and the minute pointer be desired, it is only necessary to reverse the gearing in the last illustration, so that the revolution of the pointer driven by the intermediate gearing will be as 12–1.

It is immaterial, so far as the clock movement is concerned, whether the center shaft carries the hour or minute pointer.

21st Int. Do you or not find in that clock movement—that is, the Everitt clock movement—the improvement described in the fifth claim of the complainants' reissued patent? If there is variation in any respect point it out.

Ans. So far as "a clock train consisting of three wheels
253 suitably fastened on arbors carrying pinions, and arranged between the escape wheel and its arbor carrying a pinion and the center arbor carrying the center wheel," — the claim describes, minutely and precisely, the train found in this "Ex. Everitt Clock Movement." But in the Everitt clock there is no center pinion on the center shaft, the power being applied directly to the center wheel instead of through an intermediate wheel and pinion, as in the Hotchkiss patent or in the other clock movements exhibited in this case. But I do not consider this an essential difference, so far as the train between those two points is concerned. The center pinion can have nothing whatever to do

with and in no way qualify the clock train between those two points as a train. But there being no center pinion in "Exhibit Everitt Clock" to be disconnected from the center wheel it does not, under my understanding of the fifth claim, embody the invention, if there be any, in that claim. If, however, the claim is to be construed as for the train, irrespective of his division, then the claim is fully answered by "Exhibit Everitt Clock."

22d Int. Are the pivots of the three wheels between the center and the crown wheel in this exhibit in a semicircle with the center arbor, or substantially so?

Ans. They are not in a semicircle of which the center of the center shaft is the center, but they are in an arc of a circle, for the reason that I have given, that three pivots or points cannot, except when in a straight line, be out of a circle. If your question means "within a semicircle," as in the eighth claim, and that that semicircle, as I have described in referring to that claim, is at one side of a line drawn diametrically through the center shaft, then they are "within a semicircle."

254 Def'ts' counsel puts in evidence Patent Office copy of the original letters patent issued to Arthur E. Hotchkiss, dated Nov. 4, 1879, and numbered 221,310, and it is marked "Def'ts' Exhibit Hotchkiss Original Patent, F. G. Ingersoll, N. P."

23d Int. Have you read, and do you understand, the original letters patent granted to Arthur E. Hotchkiss, of which the letters patent on which this suit is brought are the reissue? And, if so, state what you find described and claimed therein to be the invention of said Hotchkiss.

Ans. The specification first states that the "invention relates to that class of time-keepers in which a fixed annular rack or internally-toothed wheel is employed to aid a spring barrel in rotating the train of wheels," and that the invention consists, first, in the combination of such a fixed circular rack and a concentric plate with a main spring, a transmitting wheel rotating with said plate, and a fixed clock movement.

And that it consists, second, in the arrangement of the operating parts of the time-piece on a fixed plate, and attaching them to the back of the clock case by means of tongues which extend backward through perforations in the back.

And, third, in constructing the tongues which secure the movement to the back so as to leave a space between the back of the clock and the fixed plate to receive the main spring.

Fourth, in a peculiar connection for the fixed end of the main spring.

Fifth, in combining with the said fixed or back plate a rotating plate, in front of the fixed plate, which is the plate carrying
255 the planet wheel, the said revolving plate provided with a hub which extends rearward through the fixed plate, said hub connected to the inner end of the main spring, whereby the main spring will impart rotation to said revolving plate and the planet wheel which it carries.

Sixth, in combining with this hub of the revolving plate a key screw-threaded to engage the hub, and a recessed part for engaging with the prismatic end of the center shaft, which extends rearward and concentric with the hub, and so as to be reached through the hole in the hub when the key is inserted for winding.

The specification then goes on and particularly describes this peculiar construction of clock, and, referring to the necessary provision for the winding of the clock to permit the backward turning of the revolving plate, describes the substitute for "the ordinary winding pawl or dog," but does not particularly set forth the necessity of the division of the train—that is, that the forward and rear parts of the train must be disconnected for this purpose.

In summing up, the inventor claims the combination of a fixed circular rack, a stationary clock movement with the revolving plate, and the planet wheel with a device which connects the rack and movement, which I understand to be the planet wheel or its equivalent.

The second claim is for the method of securing the movement to the back.

The third is for the peculiar attachment of one end of the main spring.

The fourth is in the peculiar method employed for forming a barrel which will enclose the spring, but allow its inspection without detaching the clock from the back of the case.

256

The fifth is for the planet wheel plate, constructed with a hub extending rearward through the back plate for the attachment.

The sixth relates to the peculiar connection of one part of the train with the other—*i. e.*, between center pinion and center wheel.

The seventh relates to a fixed circular rack.

The eighth to the method of securing the front plate.

The ninth and tenth to the pendulum ball and rod.

The eleventh and twelfth to the key.

24th Int. Referring, now, to the first eight claims of the complainants' reissued Hotchkiss patent, to which your attention has been called, do you find described and claimed in the original letters patent any improvement that is described in said eight claims thereof?

Counsel for complainant- objects, first, because the application of the reissue was made less than two years after the date of the original patent; second, because it was made within a reasonable time after the original patent, and before any adverse rights had been acquired in good faith; and third, because the question is not limited to a mechanical comparison of structures.

Ans. No; I do not.

Adjourned to Thursday, January 18th, 1883—10 o'clock a. m., same place.

257 NEW HAVEN, CONN., *January 18th*, 1883.

Met pursuant to adjournment.

Present: Parties as before.

Cross-examination by Mr. MITCHELL:

25th X Int. On the supposition (whether true or false) that the term center pinion in the Hotchkiss patent includes all center pinions arranged on the center arbor, through which motion is communicated to the forward part of the trains, whether or not such pinion has a capacity of backward movement independent of its arbor for the purpose of winding the clock, do you, on that supposition, dissent from Mr. Sheppard's opinion that defendant's clock contains the subject-matter of the first eight claims, severally, of the Hotchkiss patent? In answering the question please to assume that I understand that you do not regard the construction supposed as the true construction of the Hotchkiss patent.

Ans. The supposition is an impossible one; for, if the center pinion be not disconnected, it would not be the Hotchkiss clock, and would be inoperative and would not be a clock; and if it were a clock it would be just what is disclaimed by the inventor. I cannot answer yes or no to an impossible supposition.

26th X Int. So far is it from being impossible that I have already supposed it; please answer the question with that understanding.

Ans. If you wish me to suppose that those eight claims of the reissue were drawn with a superficial intent to deceive the
258 court with the belief that they covered defendant's clock, I freely say I have no doubt of this; but that attempt is neutralized by the disclaimer, which clearly defines what is meant by the center wheel and center pinion arranged on the center shaft.

The supposition is again impossible, because without a disconnection of the two parts of the train the train could not be divided. If Mr. Sheppard, under such a supposition, finds defendant's clock to embody the invention recited in the first eight claims of the reissued patent, I cannot agree with him.

27th X Int. As I understand you, you would find that the defendant's clock contained the subject-matter of the first eight claims of the Hotchkiss patent if you did not regard that patent as limited to a train "disconnected" in the way you have pointed out; am I right?

Ans. No, sir; I would not; for that peculiar division involves something back of it—that is, the fixed rack, revolving plate, and planet wheel, with main spring operating directly upon the revolving plate. If your question means that defendant's clock has a frame "made with three plates" and a train of gearing, "parts of the train" arranged "between (the) different plates," "but not disconnected," then I have no hesitation in saying that that construction is found in the defendant's clock, and that the number and size of the wheels in that part of the train forward of the center pinion are substantially the same as in the Hotchkiss clock.

28th X Int. If, in your opinion, the Hotchkiss claims covered center pinions fixed upon their center arbors, as in defendant's
259 clock, and if, in your opinion, those claims were warranted, you would then find the subject-matter of the first eight claims in defendant's clock, would you not?

Ans. Taken in connection with the specification, no, sir; but, as it often happens in patents, the same wording of claims in two different patents embody different inventions because of the different description of elements; a specification might be written describing defendant's clock, and claims added embodying the same words as a portion of those claims; but, as I before stated, there would be no possible invention in such claims.

29th X Int. I will turn to another point for the present; suppose in the Lane clock the pawl were transferred from the main wheel to the center wheel, and the ratchet were transferred from the main arbor to the center arbor, would it still be the Lane clock and contain the Lane invention?

If the ratchet in the Lane—*i. e.*, defendant's—clock were transferred from the main arbor to the center wheel it would be useless, as it would have no effect upon the main spring; for in defendant's clock, as in all common clocks, the main spring is disconnected from the entire train by means of the ratchet on the main shaft and the pawl on the main wheel, and transferring that pawl and ratchet to where it cannot hold the main spring or engage the train would disable the train and prevent any possible action of the main spring.

30th X Int. I repeat, if the ratchet and pawl connection were transferred from the main shaft and main wheel to the center shaft and center wheel of the Lane clock, so that the only place in the train where the wheel and shaft were not fixed relatively to
260 each other would be the connection between the center pinion and its shaft, would that change prevent the clock from being an infringement of the Lane patent?

Ans. I don't know anything about the Lane patent; am not sure that I ever saw it; certainly never to examine it as to its scope, and therefore cannot answer the question.

31st X Int. Would the clock be, considered as a clock, a different clock from what it was before, so far forth as related to the communication of the impulse of the spring through the train is concerned? (Of course I concede that in winding up the clock the backward motion of the main arbor would extend along the train.)

Ans. It would be a different clock, for the reason that such a change would be unnecessary, useless, and detrimental to the clock; but making this division, whereby a portion of the train must be turned backward in winding, would not, in defendant's clock, affect the operation of the main spring.

32d X Int. The Lane clock, or defendant's clock, would, with the change supposed, contain all the eight claims of the Hotchkiss, would it not?

Ans. Under a possible construction of these claims, or some of them, such a construction might embody the Hotchkiss invention. But I do not wish to be understood to say that to take a part of the

Hotchkiss clock, necessary and essential to the Hotchkiss clock, and without which, as described and illustrated in his patent, the clock is useless, and apply that part to a good, practical, and useful movement like defendant's, and whereby such introduction would be a serious detriment or disadvantage to the clock, would infringe the patent for the invention of a clock the parts of which required this essential element.

261 33d X Int. Would the defendant's clock, in the case supposed, infringe the Hotchkiss patent? Please say no if you so understand.

Ans. No such clock movement is in this case, or submitted to me for examination. When such a movement is presented me involving that question I will cheerfully answer it.

34th X Int. I have already submitted the clock to you by description, and your answers show that you understand the description. Please answer the question.

Ans. I have never considered such a construction with reference to a possible infringement, and without such consideration I decline to answer.

35th X Int. Would the defendant's clock in the case supposed contain the mechanical subject-matter referred to in either of the claims of the Hotchkiss patent? Please say no if you so understand?

Ans. Last two answers repeated. Under possible construction of the claims it would, and under others it would not. It would be a divided, disconnected train in the sense of the division or disconnection in the Hotchkiss patent, and if either of the claims in the Hotchkiss patent are to be construed broadly for a clock train disconnected between the center wheel and center pinion, irrespective of the peculiar mechanism which makes that division necessary and essential, then, I think, that claim or claims would be infringed by the supposed construction of defendant's clock, as I have no doubt in my own mind that Hotchkiss was the first inventor of a divided or disconnected clock train, and the first to make a clock in which such division or disconnection of train was essential.

262 36th X Int. Take, for instance, the fifth claim of the Hotchkiss patent and construe it as you think it ought to be construed, whether broad or narrow, would not defendant's clock in the case supposed be within the claim?

Ans. If that claim does not call for the center pinion divided or disconnected from the center wheel, and thereby implies the mechanism which makes that division necessary and essential, then the claim, in my opinion, as I have stated, involves no invention; but if the claim is to be construed so broadly as to cover a useless, unnecessary, and disadvantageous disconnection between the center pinion and center wheel, as in your supposed construction of clock, then that supposed construction would infringe such a construction of that claim.

37th X Int. Suppose in "Def'ts' Ex. Enlarged Hotchkiss Train" the pawl and ratchet connection were transferred from the center wheel and shaft to the main arbor and the disk, would there be any change in the principle so far forth as the transmission of the power

of the spring to and through the train is concerned? (Of course, I grant that a less number of parts would rotate backwards in the operation of winding.)

Ans. In the supposed construction none of the parts would rotate backwards. (Counsel for complainant states that he refers to the main arbor carrying the spring, which is a part, and would rotate backwards.) I understand your supposed construction to imply the arrangement of the disk which carries the planet wheel loose upon the shaft, the same as in common clock movements, and with a pawl and ratchet connection and disk, with the inner end of the
263 main spring attached to the main shaft and the outer end attached directly to disk, as the connection and main spring are arranged in a common clock. Am I right?

38th X Int. Yes, as in some common clocks; and with that understanding please say whether, considered with reference to the function of the movement as a time-keeper (considered apart from the mere operation of winding), the clock would not remain the same in principle as before.

Ans. So far as transmission is concerned—*i. e.*, simply the action of the main spring—it would be the same as in the Hotchkiss and all other clocks.

But as to remaining "the same principle as before" I say no, because under that construction there is no disconnection in the train and is just what I understand Hotchkiss to disclaim in his disclaimer.

Counsel for complainant objects to answer as refraining from a mechanical comparison between the two mechanical structures, and states that he did not in the question refer to the patent, which he respectfully submits contains no such disclaimer as the witness supposes.

In view of the objection witness furthur answers:

The two constructions stated in the questions are different in principle, for the reason that one is, and necessarily must be, a divided train and the other is not a divided train.

39th X Int. I repeat, would there in the case supposed be any change in principle, so far forth as the transmission of power
264 from the spring throughout the clock, for the purpose of keeping time, is concerned? (And I repeat again that I do not omit to note that so far forth as the function of winding is concerned a less number of parts would in that operation rotate backwards.)

Ans. After the spring has been wound, and considering the transmission of power as being made throug a train of gearing, they are substantially alike, and substantially like all clocks employing a main spring.

40th X Int. Do the computations in Reid's Treatise, to which you have referred (any of them), relate to a train consisting of three wheels besides the center wheel and the escape wheel?

[Ans.] If you refer to the tables, I think he does not; but, if you refer to his rules for calculation, there is no limit to the number. I

should say, however, that the rules for calculations for trains for gearing are no different in Reid from previous well-known rules.

41st X Int. Are the computations given in Reid limited to two wheels besides the center wheel?

Ans. No, sir; for it provides for one wheel; but whether he mentions or provides for more than two I cannot say without further examination of the book. He illustrates, I think, no more than two wheels as between the center wheel and the escape wheel.

42d X Int. The three wheels referred to by you in your direct examination as included in the tables of Reid included the center wheel and two others, I suppose?

Ans. I cannot, without spending some time to examine, state which wheels they are. But there is a train stated consisting of four wheels and three pinions of the wheels; three in succession are given as having 52 teeth and the fourth 13 and the three pinions
265 as 6 each. These trains refer to watches. The table of clock trains, except in three instances, gives only three wheels. In those three instances I understand there are three wheels between the center wheel and the escape wheel. But in two of them two of the intermediate wheels have the same number of teeth and the pinions are all alike. In all the other cases there is given the center wheel and two intermediate wheels.

43d X Int. Do you find the mechanical subject-matter of either of the eight claims of the Hotchkiss patent in any prior patent or structures to which your attention has been called in this examination upon any construction which requires the presence of all the elements named in the claims, severally? If so, give the number of the claim and refer to the patent or construction which contains it.

Ans. As I understand the invention of Hotchkiss as recited in the claim, I do not, unless it be the possible construction of the fifth claim mentioned in my direct testimony and under which it would be completetly answered by the "Exhibit Everitt Clock."

44th X Int. If the term center pinion in the fifth claim is limited to a pinion turning once an hour and carrying the minute hand, you do not find the combination of the fifth claim in the Everitt clock, as I understand your testimony?

Ans. For the reason stated in answer to 21st int., I do not.

45th X Int. Upon a construction which would include the defendant's clock, do you find any prior patent or structure in this case to which your attention has been directed which shows the same mechanical structure as that found in either of the first eight claims?

266 I have only to refer to my testimony already given. I can add nothing to it.

Redirect examination:

46th R. D. Int. Since answering the 41st X int. have you further examined the Reid tables; if so, do you wish to add anything to that answer?

Ans. I have made such examination, and I find that the table on pages 157 and 158 indicates in the third column (the 1st, 2d, and 4th

illustrations) the center wheel, two intermediate wheels, and the crown wheel. In all the other statements the center wheel, one intermediate wheel, and the crown wheel are indicated.

The table on page 159 indicates the center wheel, two intermediate wheels, and the crown wheel.

The rules for computing trains of gearing is found on page 14, in chapter II, which chapter relates to the subject of the number of wheels and pinions in clock trains.

JOHN E. EARLE.

Subscribed and sworn to before me this 18th day of January, 1883.

F. G. INGERSOLL,
Notary Public.

267 *Defendants' Evidence in Rebuttal.*

United States Circuit Court, District of Connecticut. In Equity.

THE PARKER & WHIPPLE COMPANY *et al.*

vs.

THE YALE CLOCK COMPANY *et al.*

NEW HAVEN, CONN., *April 16th*, 1883—10 o'clock a. m.

JOHN E. EARLE, Esq., recalled and examined by C. R. Ingersoll, Esq., of counsel for defendant.

1st Int. Mr. Terry, the complainants' expert, for the purpose of showing that, so far as the division of the train is concerned, it is wholly immaterial where the pawl and ratchet is placed, introduced the "Ex. Hotchkiss Ratchet on Main Arbor;" state whether or not the construction shown in that Ex. is the same as that shown in the patent, and, if not, in what respect it differs, and how the movement is affected by the difference?

268 Ans. It is different—essentially different. First, in the Ex. there is no division of the train. It is continuous and connected from the main wheel to the crown wheel. Second, instead of making a division in the train between the center wheel and center pinion, and which necessitates making the center pinion loose upon the center shaft, the center pinion is made fast to the center shaft, and the ratchet, instead of being made fast to the center pinion, as in the Hotchkiss clock, is attached to or made a part of a sleeve, and arranged in rear of the rotating plate which carris the planet wheel and concentric with the center shaft, and, instead of having the pawl hung upon the center wheel, as in the Hotchkiss clock, and whereby the disconnection between the front and rear parts of the train is produced, the pawl is hung on the rear of the planet wheel plate; then, in rear of the ratchet and pawl and spring, an additional plate is introduced, which, if the movement was completed by applying the main spring, will form a partition between the main spring and the ratchet and prevent the main spring interfering with the proper working of the pawl. Third, this movement is an essentially different movement from that described in the Hotchkiss patent, in that it makes a movement having neces-

sarily two partitions between the back and the front, and thereby forming three compartments. I find nothing in the description of the Hotchkiss patent which suggests this change or improvement, if it be an improvement.

2d Int. Mr. Shepard, complainants' expert, has testified at folio 119 of his testimony that, so far as he knew, no train divided into two parts, before the Hotchkiss patent, had the center arbor and pointers so arranged as to be operated for setting from the
269 back of the clock; state whether or not you find that arrangement shown in the Davies patent in evidence.

(Objected to on the ground that Mr. Shepard's entire answer clearly refers to clocks operated for setting them from the back by independent keys.)

Ans. If by a train divided into two parts Mr. Shepard means a train divided as in the Hotchkiss patent, and, as I understand it, that division being made between the center pinion and center wheel, and so that, in winding the main spring, the said center pinion and all of the train back of it will be rotated backward, then Mr. Shepard is right, for the reason Mr. Davies does not show such a divided train, but if Mr. Shepard means a clock having a part of the train between the front plate and the middle plate, and the balance of the train between that middle and the back of the clock, then the Davies patent shows just such a movement, the center shaft carrying the minute pointer and extending rearward through the back of the clock, and with a permanent knob on the rear end of the shaft, not an independent key, whereby the center shaft may be turned at the back to set the pointers.

3d Int. Look at the clock movement now shown to you and state whether or not it represents substantially the clock movement shown in the Davies patent.

Ans. It does, with this difference only, that the movement in the patent is a marine movement and the movement in the model is a pendulum movement.

Defendants' counsel offers in evidence the clock movement
270 shown to witness, and it is marked "Defendants' Exhibit Davies' Clock Movement, F. G. I., N. P."

4th Int. In giving your reasons in your former examination why there is no invention in your opinion in the subject-matter of the first four claims of the Hotchkiss patent, did you intend by anything you said in that testimony to limit those reasons to the fact that the patentee had, in your opinion, disclaimed such subject-matter in his specification?

Ans. No, sir; and my answer to that question on page 72 does not warrant such an interpretation; the reference in that answer to the disclaimer is only made to show the recognition by the inventor of the prior state of the art recited as so known, beginning at folio 211, and in closing that answer said "from the known state of the art and from the acknowledgment of it made by the inventor in his specification I answer no;" such an acknowledgment by the in-

ventor was stated by me only in confirmation of my opinion based on the prior state of the art.

5th Int. Have you, since your former testimony, examined Reid's Treatise and the tables contained therein for the purpose of ascertaining whether Mr. Hotchkiss in constructing his clock movement had determined upon the length of his pendulum rod and the vibrations — his 3-wheeled train was or not a mathematical result of the rules given by Reid in his treatise? And, if so, state what was the result of your examination.

Ans. I do; Reid's Treatise provides for ascertaining the length of the pendulum having the number of vibrations given by log-
271 arithms on page 144, and by standard length 140; on page 14 he makes a rule for ascertaining the number of teeth and wheels:

"In order to ascertain what the number for the wheel teeth of a clock or watch movement should be three things are requisite to be known or fixed upon.

"First, the number of beats to be given in a minute or in an hour.

"Second, the number of the pinions and of their leaves.

"And third, the number of teeth it is intended for the swing or balance wheel to have."

Then follows the rule, page 14.

Having determined upon the length of his pendulum and thereby having ascertained the vibration per hour, or *vice versa*, Mr. Hotchkiss found 15,808 vibrations per hour, and inasmuch as he desired a small movement with large teeth he determined upon the next requirement the number of pinions and their leaves, to wit, 4 pinions with 8 leaves each. He next determined his crown wheel to be 38 teeth. Then following the rule laid down in Reid, page 14, he multiplied the number of vibrations in an hour by the number of leaves of each pinion and divided that by twice the number of teeth in the crown wheel, which is the number of vibrations produced by each revolution of that wheel.

This done the rule requires that this amount shall be divided by 2 as many times as can be done without a remainder, then that remainder divided by 3, 5, 7, 11, 13, &c., until there is no remainder.

This division shows that that amount may be divided by 2
272 sixteen times and leave thirteen remainder; that $13 \div 13$ leaves no remainder.

Now, as there are four pinions there must be four wheels, one of which is the center wheel.

Starting then with the 13, in accordance with the rule, we multiply the 13 by the next preceding divisor 2, which gives 26.

If we multiply by 2 we should have 52 as the number of teeth for the center wheel, but, as this would be manifestly too large, the number 26 is taken for the number of teeth of the center wheel. We then have 15 of the divisors 2 left for the three remaining wheels, and five of those divisors being given to each, we have, in accordance with the rule, $2\times2\times2\times2\times2=32$ for each of the three remaining wheels.

The following is the demonstration of the problem in accordance with the rule, step by step:

Rule.

The number of vibrations or beats in an hour being multiplied by the number of leaves in each pinion, or, what is the same thing, each pinion being multiplied into one another, and with the product multiply the number of vibrations in an hour, this last product being divided by double the number intended for the swing or balance wheel, will give for the quotient such a number that when divided by prime numbers, first by two, as often as it will divide by two without leaving a remainder; then by three as often as it will divide by it; by five as often as it will, and by seven, eleven, thirteen, etc., until no remainder is left, and afterwards arranging the divisors, they may be made out so as to have sets of them, which when multiplied into one another will give the proper numbers for the wheel teeth required. A few examples will make the matter so plain and easy that few can fail to comprehend them, and the numbers in a common clock movement being known to almost every clock-maker, an example of it shall be taken for the first in order that the beauty and facility of the rule may the more readily be seen.

Given 15,808 vibrations per hour, 4 pinions, 8 leaves each; crown wheel, 38 teeth—15,808×8×8×8×8=6,479,568÷(38×2=851,968—

Third wheel	2—	851968
	2—	425984
	2—	212992
	2—	106496
	2—	53248
Second wheel	2—	26624
	2—	13312
	2—	6656
	2—	3328
	2—	1664
First wheel	2—	832
	2—	416
	2—	208
	2—	104
	2—	52
Center wheel	2—	26
	13—	13
		1

273

13×2=26 center wheel.
2×2×2×2×2×2=32 first wheel.
2×2×2×2×2×2=32 second wheel.
2×2×2×2×2×2=32 third wheel.

This gives a train having a crown wheel with 38 teeth; center

wheel, 26 teeth; three intermediate gears, 32 teeth each, with their four pinions, 8 leaves each.

Having, therefore, followed the directions preceding the rule as to the requirements before calculating the train, Mr. Hotchkiss must almost necessarily have been led to precisely the train he has described in his patent.

For, having decided on the number of pinions he would have in the train, and which is a mere matter of convenience, he was necessarily led to making the three intermediate wheels, each with the same number of teeth, for the reason that the least possible deviation from such uniformity of teeth would have produced a train of three wheels having, respectively, 16, 32, and 64 teeth, which would have been manifestly an impractica-l- train for so small a clock, where large teeth are desired.

6th Int. Has it long been known and obvious to the mechanic that, having a given wheel with a given number of teeth, coarser teeth can be obtained and the same result effected by duplicating or multiplying the number of wheels and pinions, with the corresponding reduction in the number of teeth?

Ans. If I understand your question—yes. To illustrate: Suppose a wheel of 1 inch diameter to have 64 teeth working into a pinion with 8 leaves; now, to obtain the same result and increase the
274 size of the teeth, take two wheels of the same 1 inch in diameter, cut 32 teeth in each, and an intermediate pinion of 8 leaves, and precisely the same result is attained, and the pitch or size of the teeth twice as large.

To increase the size of the teeth of the gear one of two things must be done: First, an additional wheel or wheels, as I have just described, or, second, the diameter of the one wheel must be increased proportionately. These are well-known laws in mechanics.

7th Int. Mr. Shepard, complainants' expert, has laid in evidence certain drawings showing in parallel columns the separate elements of the Hotchkiss and Lane clock. Will you arrange in like parallel columns the actual parts of those two clocks respectively, and also the parts of some well-known ordinary clock movement existing before the Hotchkiss patent?

Ans. I have prepared such an exhibit of parts and will arrange the parts as requested.

Defendants' counsel offers in evidence the parts produced by witness, and, as arranged, they are marked "Defendants' Exhibit—Earle Exhibit Hotchkiss, Lane, and Weewag Clock Parts," F. G. I., N. P.

(Counsel for complainants objects to introduction of exhibit as not proper in rebuttal, especially as complainant- cannot reply to the same in time to prepare the case for hearing at the term for which it is noticed.)

8th Int. What is the Weewag clock?

275 Ans. It's a movement long well known, and substantially the clock made by the New Haven Clock Company.

(Weewag clock objected to as not in the answer.)

9th Int. In your answer to int. 1, in rebuttal, you have pointed out the difference in the movements shown by "Complainants' Ex. Hotchkiss Ratchet on Main Arbor" from the patented Hotchkiss movement. State whether or not in your opinion the movement shown by the Ex. is patentably different from the other.

Ans. I think it is; I have no doubt of it. In my opinion the change made in this movement involves quite as much if not more invention than anything contained in the original Hotchkiss clock.

10th Int. Mr. Terry, in his answer to compl'ts' int. 4, refers to a patent issued to Fred'k A. Lane, Apr. 25, 1882, and which appears to have been taken out by you, as the patentee's att'y, as evidencing some inconsistency in your testimony respecting the significance of the words "division plate" or "divisions of the train." What have you to say to that?

Ans. There is no inconsistency, nor is that specification open to any possible construction inconsistent with my testimony, but, on the contrary, fully confirms my testimony in that respect.

In the specification the plate B is called a division plate, arranged between the front and rear plates, and is a practical demonstration of the supposed case described by me in folio 193 in my testimony in chief.

It is a division plate as to the frame, the same as the petition referred to in folio 193 is a division of the room, and precisely the
276 same kind of division in clock movements known long prior to and recognized in the Hotchkiss patent. But in no sense, with reasonable meaning of language, can that plate be said to divide the train, either in Lane patent or in the previous 3-plate movements. There is nothing in the specification to intimate that the train is divided, nor could there properly be, for the reason that the train is not divided. The term division plate in that specification is used only in the sense of a partition between the front and rear plates. Nowhere in my testimony have I said that the middle plate in the Hotchkiss patent was not a partition dividing the frame into two divisions, but quite the contrary, as my testimony on page 74 will show.

Cross-examination by Mr. MITCHELL:

11th X Int. Do you mean by anything you have said that "Ex. Hotchkiss Ratchet on Main Arbor" does not contain the subject-matter of any of the eight claims in controversy and found in the Hotchkiss reissue?

Ans. I have not considered this new movement in connection with the Hotchkiss patent as to whether it contained the Hotchkiss invention or not; but it certainly has not a train divided between the center wheel and center pinion, and does not in my opinion infringe either of the claims of the Hotchkiss reissue in which I have said that peculiar division is a necessary element.

12th X Int. Does the Hotchkiss patent in suit exhibit a division plate in the same sense as that expression is used in the Lane patent of 1882?

Ans. It has a plate or partition between two other plates, and to

277 the extent that it is a partition of the frame it may be said to divide the frame; but the division plates of the two are essentially different, due to the fact that one (the Lane) is a common connected clock movement and the other (the Hotchkiss) is a divided or disconnected train.

13th X Int. Are the division plates in the Lane of 1882 and the Hotchkiss reissue alike in this, that they divide the frame into two compartments in both cases?

Ans. In the same sense that all three plate movements were divided prior to the Hotchkiss, yes, sir; but in any other sense, no sir.

14th X Int. In the Lane of 1882 and the Hotchkiss in suit is the position of the division plates in both such that the wheels in both movements are arranged, some of them on one side of the division plate and some of them on the opposite side of the division plate?

Ans. Yes, sir; that is the case in most of the three-plate movements, and is fully recognized in the Hotchkiss patent as so arranged prior to the Hotchkiss invention.

15th X Int. And in the Hotchkiss reissue in suit and in the Lane of 1882 the division plate constituted a dividing or separating agency in the sense that all the shafts are upon one side or the other of the division plate with the single exception of the center shaft; is that so?

Ans. Not as a separating agency, for the partition performs no office as separating the parts; it is simply a partition for the bearing of the shafts.

278 In the Lane patent the center shaft takes its bearing in the front and rear plates; the main shaft takes its bearings in the rear and middle plates distant from the center shaft; all the other shafts take their bearings in the middle and front plates.

In the Hotchkiss reissue the center shaft may be said to take its bearing in the rear and front plates, and the main shaft to have its bearing on the center shaft as it is concentric with and revolves on it; or, if the center shaft may not be said to take its bearing in the rear plate, then it has its bearing in the main shaft. All the wheels of the train forward of the center pinion are forward of the middle plate and take their bearings in the middle and front plates.

16th X Int. I repeat. The division plate in the Lane of 1882 and in the Hotchkiss reissue is so located as that all the wheels forward of the center pinion are arranged in front of the division plate; and all the other wheels are on the other side of the division plate; is that so?

Ans. That is so. I should, however, state that the relative position of the wheels forward of the middle plate, differs from that in the Hotchkiss, as in the Lane patent the center wheel is the extreme forward wheel—*i. e.*, nearest the front plate—and all the other wheels in rear of it, whereas in the Hotchkiss the center wheel is close to the middle plate and the other wheels in front of it.

17th X Int. I repeat. Is it not true, without qualification, that

the division plate of the Lane of 1882 and in the Hotchkiss reissue is so located in each case that all the wheels forward of the center pinion are in front of the division plate, while all the other wheels are on the other side of the division plate?

Ans. Irrespective of the different peculiarities of the two, yes, sir.

279 18th X Int. And the same is true in the Lane clock put in evidence and known as the Yale Gem, is it not?

Ans. If the peculiarities which constitute the invention of Hotchkiss are not considered, yes, sir.

19th X Int. It is true, in an absolute sense, is it not, that in the Yale Gem all the wheels forward of the center pinion are on one side of the division plate, the remainder being on the other side of the division plate?

Ans. It is, if your question does not involve the qualification in my last answer.

20th X Int. In giving your reply to interrogation 5 you state that, after ascertaining the number of vibrations per hour for his pendulum, Mr. Hotchkiss next determined the number of pinions, to wit: "four pinions with eight leaves each." How do you know that he decided upon four pinions of eight leaves each at that precise stage of his clock?

Ans. I do not wish to be understood as saying that he may not have had some thought or consideration, perhaps, of various sizes of pinions, and he may have made many experiments, but when he came to the final train he must have determined the number of pinions and the number of leaves in those pinions before he could calculate his train. That is and has been for years a prerequisite to the mathematical calculation of a train. Possibly Mr. Hotchkiss may have determined his train by experiment; but with the rules and information for doing that at hand or easy of access it would have been a waste of time, and I can hardly believe that any man as familiar with clocks as Mr. Hotchkiss would have resorted to such experiment, and in stating what Mr. Hotchkiss did I have

280 only stated what he or any other man might have done with the rules and information open to him, and not that I know that he did do so.

21st X Int. You, in reply to question 5, go on to say that Hotchkiss next determined his crown wheel to be 38 teeth; that is your surmise, I suppose, and you do not intend to be understood as saying that you have actual knowledge to that fact?

Ans. I have no knowledge of Mr. Hotchkiss' methods and have only used an illustration representing a person who had such a thing to do. The number of teeth in the crown wheel is another prerequisite to the calculation of the train, and as the crown wheel in the Hotchkiss movement has 30 teeth, I must presume that that was the number of teeth that he determined upon.

22d X Int. But he may have begun his experiments with a crown wheel of 30 teeth or 32 teeth or 35 teeth, may he not?

Ans. He may have begun his calculation with any number, but the final calculation must have been 38 teeth.

23d X Int. It is conceivable, is it not, that in utter ignorance of Reid, Hotchkiss hit upon his idea of three wheels while studying and experimenting with reference to securing compactness in his clock, then made some rude calculations of a practical character, determining approximately the teeth in his wheels and the leaves in his pinions, and then by experiment found the length of the pendulum rod that would make the clock keep time; isn't that so?

Ans. Knowing Mr. Hotchkiss as I do and his capacity as a mechanic, I cannot believe such a possibility. Reid's Treatise is a book which has been well known for many years as a standard work; but, aside from Reid, there are other books which give this
281 information. Calculations for the height and vibration of pendulum and rules for calculating trains of gearing are to be found in several Mechanics' Companions, but I know of none more simple or easily understood by a mechanic than Reid's.

24th X Int. Does the three requisite rule- cited by you from Reid provide a way for making a train of three wheels, all of them between the center wheel and the crown wheel having the same number of teeth in all cases?

Ans. Different vibration- will, of course, give different wheels, but having the number of vibrations of the Hotchkiss pendulum given, no other practical result could have been arrived at. As I have stated in my previous answer on this subject, the center wheel was unavoidably 26, leaving fifteen divisors 2 for the three wheels; and these fifteen divisors can only be (practically) equally divided, giving 32 teeth in each wheel. The least possible variation from these three wheels of 32 teeth each would have been three wheels having 16, 32, and 64 teeth.

25th X Int. May not Hotchkiss have first tried a length of penpulum rod upon which to base his calculations which give him three wheels of, respectively, 16, 32, and 64 teeth; and then, having in view the purpose of securing economy in space or some other consideration entirely apart from the mere mathematical calculation, have adopted three wheels of 32 teeth each and then experimented with the length of his pendulum rod till his clock kept good time?

Ans. Supposing Mr. Hotchkiss to have made a train 16, 32, 64, and 26, a supposition which I cannot recognize as possible, owing to its manifest impracticability, he could not reduce the size of the larger wheel without making them all equal and all 32.
282 Further than this, any one who has any knowledge of trains of gearing would instantly see that a train 16, 32, 64, 26, could be changed to 32-32-32-26 without changing the result.

29th X Int. If this thing is so obvious to the mechanic and a mere question of mathematics, why is it that during the last fifty years since Reid's Treatise was written no clock with three wheels between the center wheel mounted upon an arbor carrying the minute hand and the crown wheel was ever made until this invention of Hotchkiss?

Counsel for defendant- objects to the question because it assumes a fact which is not in evidence.

Ans. Your assumption of facts is wrong; the Everitt clock is such a clock. Aside from this, however, I presume it is for the same reason that a thousand and one things are done which have never been done before, but which are done in accordance with well-known mechanical laws, but which no one has the presumption to call invention; and, for the same reason, clock movements with trains of four, five, or six wheels may not have been made.

27th X Int. You do not mean to be understood as saying that you find in the Davies' clock a train located on opposite sides of a division plate, having the center pinion in the rear of the division plate, as in the Hotchkiss clock, nor having the center arbor rotated by an independent key through the back, do you?

Ans. It has not an independent key. A part of the train is in rear of the one plate; the remainder of the train is forward of that plate; but the center pinion is not in the rear of that plate.

283 Redirect by Mr. INGERSOLL:

28th R. D. Int. State whether or not the trade has called for small clocks, such as in size and appearance like the Davies' clock, for example, until within the last 8 or 10 years.

Ans. It was within this time that manufacturers have been reducing the size of clocks and making them with very small movements, for the purpose of making sheet-metal cases.

JOHN E. EARLE.

Subscribed and sworn to before me—

F. G. INGERSOLL, *N. P.*

Clark B. Bryant.

Direct examination by CHARLES R. INGERSOLL, Esq.:

1st Int. What is your name, age, residence, and occupation?

Ans. Clark B. Bryant; 55; New Haven, Conn.; superintendent of the movement department of the New Haven Clock Co.

2d Int. What experience have you had in the manufacture of clocks?

Ans. I have been at work at it for 39 years.

3d Int. Please look at "Complainant's Exhibit Defendants' Clock" and say how long it would take a clock manufacturer, having all the usual facilities for clock-making, but with no tools or apparatus special to this clock, to fit up tools and apparatus so as to be prepared to furnish it as ordered in the market.

Ans. It ought not to take more than three or four months.

4th Int. Have you had any recent experience in getting
284 out a new clock movement in the factory of the New Haven Clock Co? If so, state what kind of movement it was generally, and how long it took to get it out.

Ans. I have had such experience; it was a large time-piece movement. The model was commenced after the 1st of Aug. last, and we finished some of them in January following.

5th Int. Since you have been superintendent of the movement department of the New Haven Clock Co., about how many new kinds of movements have you got out, do you think?

Ans. About six or eight new kinds.

6th Int. Were these all large movements? How did they compare in size with defendant's clock?

Ans. They were not all large movements. Most of them were larger than this, however.

Cross-examined by Mr. MITCHELL:

7th X Int. It is reputed that the New Haven Clock Co. has been engaged in getting out a small clock of a size somewhat similar to that of Lane's; is that correct?

Ans. Not latterly—not similar to this.

8th X Int. Have they been engaged in getting out a small clock which is not yet put upon the market?

Ans. They got out a small lever clock, but it has been placed on the market.

9th X Int. When were those lever movements first delivered in due course of business.

Ans. I can't think whether it was January or February last—one or the other.

285 10th X Int. How long is it since the New Haven Clock Co. began to get up that small movement?

Ans. I don't remember; I think it is about a year since they took hold of it.

11th X Int. To the best of your recollection, was it not more than a year from the time they took hold of it before they had that small movement on the market, in due course of business?

Ans. It don't seem as though it was, but I can't tell.

12th X Int. Have not the New Haven Clock Co. first-class facilities for getting out new movements for clocks?

Ans. Yes, sir.

13th X Int. Is the small lever movement of which you have testified the only small clock approaching in smallness of size the Lane clock that the New Haven Clock Co. has got out?

Ans. It is for the last two years or year and a half, I guess.

14th X Int. What other clock approaching in smallness of size the Lane clock has the New Haven Clock Co. got out at any time within six years?

Ans. They have got out three different lever clocks; the Weewag—I don't know whether that would come within six years or not.

15th X Int. How small a case would the Weewag go in?

Ans. About six inches high, I should think.

16th X Int. How large a case did the other clocks require as compared with "Ex. Defendants' Clock?"

Ans. Nearly twice the length and width, except one, which had a round case 4 inches in diameter.

17th X Int. Do not these small clocks, like the Lane, require much closer work than such clocks as the large time-piece
286 which you commenced last Aug., and of which you finished some last January?

Ans. No; I should think not; not in tool-making.

18th X Int. Don't they require closer work in some departments?

Ans. Not without it is the turning.

19th X Int. Is it not necessary to be more particular in all matters of adjustment in such little clocks than in the large time-piece movements?

Ans. Probably a little more in the escapement.

20th X Int. I suppose you have not taken into consideration anything but the movement, in giving your opinions as to the time for producing them?

Ans. I have not.

21st X Int. When did the New Haven Co. get fully ready to furnish the trade with completed clocks containing the large time-piece movement, which was begun the first of August last?

Ans. About two or three weeks ago.

22d X Int. Turning, now, to the small lever movement which you finished in January or February last, when were complete clocks finished containing those movements?

Ans. We don't complete them; [we] sell the movements.

23d X Int. To whom do you sell them?

Ans. Jerome & Co., in New York.

24th X Int. When did they first get them on the market in cases?

Ans. I don't know; never have seen them.

25th X Int. The Jerome Clock Co. is under the same management as the New Haven Clock Co., is it not, in general?

287 Ans. The manager has no interest in the New Haven Clock Co. that I am aware.

26th X Int. Were you not at least a year and a half in getting out that small lever movement?

Ans. I don't think that we were; there were months that we didn't touch it after we commenced it.

27th X Int. How many months at any one time will you testify that that movement or any of its parts was not touched?

Ans. I can't tell. I don't know.

28th X Int. Can you say that it was not more than two years from the time that the New Haven Clock Co. commenced work upon that small lever movement before it was in the market?

Ans. I am certain it was not as long as that.

29th X Int. Is the small lever clock in the market yet?

Ans. I don't know. I have never seen them.

30th X Int. In giving your opinion that it ought not to take more than 3 or 4 months to be prepared to furnish def't's clock as ordered in the market, what did you assume as the starting point of preparation?

Ans. Making the tools.

31st X Int. What did you assume that the tool-maker had to work from?

Ans. A model or drawings.

32d X Int. Do you mean a model that would keep time?

Ans. Yes, sir.

33d X Int. Do you know how much time you ought to add for

getting out the case to the time which you have given for
288 getting out the movement or do you not profess to be acquainted with case-making?

Ans. I am no case-maker.

34th X Int. In giving your answer to the int. 3 you say you assumed that the tool-maker had a working model. Suppose that a clock-maker, with ordinary facilities, started with nothing but the theoretical drawings of a patent, with no working model, would not such clock-maker do well if, thus commencing, he overcame all obstacles and had the Lane clock in the market, say, from six months to a year after he had begun to work from the theoretical drawings? Please to note that I say the whole clock and not merely the movement.

Ans. I shouldn't think he was very smart if he didn't do it in six months or less.

35th X Int. Would not more clock-makers take a year to perfect the clock and get it into the market than would do it in six months?

Ans. I don't know what other clock-makers would do. I shouldn't think I was doing very well if I didn't do it in that time.

36th X Int. Did the New Haven Clock Company ever get into market any clock involving the production of a new movement and a new case inside of six months from the time when there was nothing in existence pertaining to that clock excepting theoretical drawings?

Ans. I know nothing about cases. We have got up a quite a number of movements inside of that time.

37th X Int. Did they ever get a perfected clock, including
289 a new movement and a new case, into the market within nine months of the time when the theoretical drawings were made?

Ans. I don't know, but I think they have.

Redirect by Mr. INGERSOLL:

38th R. D. Int. In the general manufacture of the New Haven Clock Company does not the making of the case go on concurrently with the making of the movements, but in different departments?

A. Yes, sir.

39th R. D. Int. And sometimes does the case come out ahead of the movements?

Ans. I don't know; probably.

40th R. D. Int. In this large movement to which you have referred as commenced in August last and finished in January, what was the size of the movement?

Ans. It was about five inches by two and a half or three—the frame.

41st R. D. Int. And into what size of case was it put?

Ans. There are two sizes, 12-inch and 14-inch dial—case probably 36 to 40 inches long—cases made of wood.

42d R. D. Int. Was this clock made for the general market?

Ans. Made for the Standard Time Company.

43d R. D. Int. On a special order from them?

Ans. Yes, I suppose so.

44th R. D Int. For what purpose did they require it—not to sell, was it?

Ans. I don't know whether they proposed to sell it or not. I heard both ways.

290 45th R. D. Int. Now, as to the small lever clock to which you have referred, if there is any reason why it should have taken twelve months or so for the making of that movement when it would not require more than three or four months in the case of the Lane clock, please state what that reason is.

Ans. It was a different class of work, and required special tools, lathes, wheel cutters.

46th R. D. Int. Why so?

Ans. It had solid steel pinions.

47th R. D. Int. And did not those solid steel pinions require special machinery to cut them?

Ans. Yes, sir; they did.

48th R. D. Int. If you can give an idea, by comparison of how much more work there would be in making a clock such as the time lever, than in a clock like the Lane clock, please do so.

Ans. I should say it would be 3 or 4 times more.

CLARK B. BRYANT.

Subscribed and sworn to before me.

F. G. INGERSOLL, *N. P.*

Defendants rest.

291 And at the term of said court held at New Haven on the fourth Tuesday of April, A. D. 1883, the plaintiffs, by John K. Beach and Charles E. Mitchell, their counsel, duly appeared, and the defendants, by B. F. Thurston and Charles R. Ingersoll, their counsel, also appeared, and said cause was fully heard, and on the 2d day of October, 1883, the court filed its opinion in the words and figures following, viz:

292 Circuit Court of the United States for the District of Connecticut.

THE PARKER AND WHIPPLE COMPANY and ARTHUR E. HOTCHKISS
v.
THE YALE CLOCK COMPANY *et al.*

SHIPMAN, *J.*:

This is a bill in equity to restrain the defendants from the infringement of reissued letters patent No. 10162, issued March 14th, 1882, to Arthur E. Hotchkiss for improvements in clock movements. The original patent was dated November 4th, 1879. The application for the first issue, No. 9656, granted to said Hotchkiss April 12th, 1881, was filed in the Patent Office January 22d, 1881. The application for the present reissue, No. 10162, was filed July 19th, 1881. The Parker and Whipple Company are exclusive licensees under the original and reissued patents.

At the date of the invention expensive clocks of tiny size were being made, which met with favor from the public. They were convenient and attractive, and the main object of the patentee (the original specification says a leading object) was to make a
293 good time-keeping clock of the like small size which could be furnished to the public at the small price which characterizes the manufacture of Connecticut clocks. The clock was devised for this end, unquestionably, with much study and painstaking, and I shall assume that the invention, as claimed in the reissue, was both novel and patentable. Much skill and ingenuity have been displayed in attacking and defending these contested points, but, as I think that a vital point of the plaintiffs' case depends upon the validity of the reissue, I shall confine myself to that question.

The patentee, in his original specification, stated the nature of his invention as follows: "This invention relates to that class of timekeepers in which a fixed annular rack or internally-toothed wheel is employed to aid a spring barrel in rotating the train of wheels.

The nature of said invention consists partly in the combination of a fixed internally-toothed circular rack and a concentric going barrel or plate with a main spring, a transmitting wheel rotating with said barrel, and a fixed clock movement.

It also consists in arranging the operating parts of the time-
294 piece on a fixed plate and attaching the same to the back of the clock case by means of tongues which extend out from said plate through perforations in the back of said case.

It also consists in providing said tongues with broad shoulders, which cause said plate to stand out from the back of the clock case, so as to leave space for the main spring between them.

It also consists in the combination of a main spring having a perforated end with a lateral finger extending from the broad part of one of said tongues, whereby said main spring is firmly held at its fixed end, yet easily detatched.

It also consists in the combination, with a fixed plate which confines the main spring and supports the movement, of a rotating plate arranged in front of said fixed plate and provided with a hub which extends through said fixed plate and is connected to the winding end of the main spring.

It also consists in adapting to and combining with the hub thus constructed a key having a screw-threaded winding part for engaging with said hub and a recessed part for engaging with the prismatic end of the center shaft.

295 It also consists in constructing the annular rack or internally-toothed wheel with an annular recess for receiving the pillar plate, and thereby economizing space.

It also consists in constructing the pillar plate and pillars in one piece and attaching said pillars to the front plate by twisting them.

It also consists in substituting an automatic winding dog, operating like an escapement verge, for the click and spring ordinary used.

It also consists in constructing the case with an opening at the bottom and adapting the key and the adjusting nut of the pendu-

lum ball to one another, so that the adjustment of the said ball may be effected conveniently from the outside of the case.

It also consists in providing said ball with a spring which will force it down into place and with a guide which will prevent it from "turning."

The twelve claims of the original patent were confined to these details thus enumerated in the specification.

In March, 1880, the Parker & Whipple Company entered into a contract with the Yale Clock Company to manufacture the Hotchkiss clock at a stipulated price per clock, the licensees furnishing
296 the dies and tools for such manufacture. About 50,000 clocks were made by the defendants and delivered to the licensees between June 17th and Dec. 27th, 1880. During this period the defendant, Frederick A. Lane, superintendent of the Yale Clock Company, made the infringing clock. It did not contain a single patented feature of the Hotchkiss clock, but in respect to every other leading feature the parts of the two clocks are interchangeable. The Lane clock was immediately patented, was put upon the market, and is being manufactured by the Yale Clock Company.

An examination of the Hotchkiss patent showed that the vital parts of the invention were not alluded to in the specification or in the claims, perhaps — the fact that the clock had three wheels, and their positions might have been understood by an expert from drawing No. 6. That drawing was not made for the purpose of showing the wheels, and it is manifest from the specification that the patentee did not suppose they had anything to do with his invention, which he did suppose lay in entirely other parts of the clock. The model showed a complete clock, and contained whatever was and was not invented by Hotchkiss.

297 In the specification of the second reissue the patentee omitted the entire description which has been quoted and inserted *in* the following:

"My invention relates to an improvement in clock movements, the object being to make a clock movement which shall be simple and durable in its construction, of small initial cost in manufacture, and the several parts of which shall be relatively arranged in such manner that the movement may be inclosed in a small and compact case.

"To this end, the invention consists in dividing the train into two parts.

"In arranging the divisions of the train in a frame having three plates.

"In providing an additional wheel and pinion between the escape wheel and centre wheel.

"In making the three wheels between the escape wheel and centre wheel with the same number of teeth and of the same size.

"In arranging the pivots of the three arbors carrying the three like wheels and pinions between the escape wheel and centre
298 wheel in the circumferences of circles which are concentric with the centre arbor.

"And in other minor improvements, as the invention is hereinafter more fully described and explained by reference to the drawings."

In accordance with this statement the plaintiffs' experts claimed upon the trial that the invention consisted, generally, in the division of the train into two parts by means of a frame having three plates, the point of division being between the center wheel and the center pinion, and, secondly, in the arrangement, between the center wheel and the escape wheel, of three wheels, which are driven by the center wheel in the circumference of a circle which is concentric to the center arbor, the three wheels being arranged on a semicircle concentric to the center pinion. This general outline of the invention is stated with accuracy and completeness in eight claims of the reissue, four of which relate to the division of the train into two parts in a frame having three plates, while the other four relate to the arrangement of the three wheels. The 10th and 11th claims relate to details which were specified in the original patent, but which are not used by the defendant. The defendants infringe the first eight claims.

299 The position of the plaintiffs is that the invention of the reissue was the invention of Hotchkiss, and was shown in the model accompanying the original application for a patent, and that, therefore, the *the* description in the reissue is not to be regarded as new matter, but as a correction of a misstatement in the description contained in the original specification.

The defendants, making no point in regard to laches in applying for a correction of the original patent, deny the plaintiffs' premise and conclusion. They deny the premise, because they say that the original description limited the invention to that class of time-keepers in which a fixed annular rack or internally-toothed wheel is employed to aid a spring barrel in rotating the train of wheels, and that this construction only was shown in the model, and that the importance of the Lane invention consisted in the abandonment of the "planet wheel" and the substitution therefor of the ordinary main spring.

If the premise was true, they deny the conclusion, because it is a fact, the truth of which is apparent, that in the original
300 specification and drawings the patentee gave no hint that he regarded the construction described in any one of the first eight claims as forming any material or immaterial part of his invention.

Waiving the question whether the patentee, if he could reissue at all, was not confined to the peculiar class of clocks which he had described in his original specification, he having given no suggestion or indication that any other sub-combination than those which he had named would be of value or would perform an office of its own, and conceding that if the subject of the first eight claims could be introduced into a reissue they could also include a clock not having the driving gear of the model, I proceed to consider the question whether the invention described in these claims, being an invention of which no trace is to be found in the original specification, and

being manifestly other and different from that which was the subject of the original patent, is an invention which can be included in the reissue.

The plaintiffs plant themselves upon the well-known phraseology which has been used both by the Supreme Court and by its
301 individual members, that a reissue (if seasonably applied for) can include what was shown, substantially suggested, or indicated in the original specification, drawings, or model, and say that the real invention of Hotchkiss existed, and therefore was shown in the model, and therefore a reissue can take it in. I do not think that prior to the definition of new matter in Powder Co. *v.* Powder Works, 98 U. S., 126, such a reissue as this is would have found favor in the eyes of a court, for the eight claims which are in controversy are a total abandonment of the principles which are stated in the original patent to be those of the invention, and are an introduction into the reissue of a subject-matter which has no relation to the original patent, except that each patent relates to clocks. But since the decision to which I have referred, taken in connection with other later decisions, which throw light on the subject, the question is one which seems to me to be settled.

In Powder Co. *v.* Powder Works the court say: "The Legislature was willing to concede to the patentee the right to amend his specification so as fully to describe and claim the very invention attempted to be secured by his original patent, and which was not fully
302 secured thereby, in consequence of inadvertence, accident, or mistake, but was not willing to give him the right to patch up his patent by the addition of other inventions, which, though they might be his, had not been applied for by him, or, if applied for, had been abandoned or waived. In applying the Powder Works case to the facts detailed in Yale Lock Co. *v.* Scovill M'f'g Co. (18 Blatchf. C. C. R., 248) this court used this language, which is cited by the plaintiffs with commendation as applicable to the present case:

"If the patentee has made a palpable mistake and has limited his real invention by a misstatement of its principles, so that he is about to lose the fruit of his labor, he should be permitted to restate and, if need be, enlarge his specification, so as to include the same invention which was plainly the subject of, but was not fully secured by, the original patent, although literally the enlarged invention is one which he did not apply for in his original specification, because that specification by a misstatement of his actual invention applied for a narrower patent than he was entitled to have."

The facts in the Yale Lock case were very different from those in this case. It might as well be said that the Copernican sys-
303 tem was a mere restatement of the principles which had been misstated in the Ptolemaic system, as that this reissue was a restatement and enlargement of the principles of the invention which was the subject of the original patent.

I am not unmindful of the strong equities in favor of the plaintiffs growing out of the error of the inventor in regard to the nature of his invention and of the fact that Mr. Lane availed himself of

the error in a manner and by an expedition which indicated that he was more intent upon commercial success than upon nice observance of the golden rule; but I am clearly of opinion that the statute in regard to reissues forbids such a radical transformation of a patent as was attempted in this reissue.

The bill is dismissed.

John S. Beach, Chas. E. Mitchell, John K. Beach, for the plaintiffs; Benj. F. Thurston, Chas. R. Ingersoll, S. H. Wagner, for the defendants.

303½ And on the 5th day of October, 1883, the following final decree was made and entered in said cause, viz:

304 At a stated term of the circuit court of the United States of America for the district of Connecticut, held at the United States court room in the city of Hartford on the third Tuesday of September, 1883.

Present: Hon. Nathaniel Shipman, district judge.

THE PARKER AND WHIPPLE COMPANY and ARTHUR E. HOTCHKISS
vs.
THE YALE CLOCK COMPANY *et al.*

This cause having come on to be heard upon the bill of complaint, answer, and replication, and upon the proofs taken and filed in said cause, and having been argued by counsel for the respective parties—

Now, therefore, on consideration thereof, it is ordered, adjudged, and decreed, and the court does hereby order, adjudge, and decree, that the complainants' said bill of complaint be, and the same hereby is, dismissed, with costs to the defendant- to be taxed.

N. SHIPMAN,
District Judge.

305 I, Edwin E. Marvin, clerk of the circuit court of the United States for the district of Connecticut, do certify that the foregoing is a true copy of the original record in the matter of The Parker & Whipple Company *et al. vs.* The Yale Clock Company *et al.*, in this court.

In testimony whereof I have hereunto set my hand and the seal of said court, at Hartford, in said district, this 6th day of November, A. D. 1883.

[Seal of Circuit Court, Connecticut.]

EDWIN E. MARVIN, *Clerk.*

Endorsed on cover: Connecticut C. C. U. S. No. 204. The Parker and Whipple Company and Arthur E. Hotchkiss, appellants, *vs.* The Yale Clock Company and Henry C. Shelton, Frederick A. Lane, and Paschal Converse. Filed 8th November, 1883.

123-87

SUPREME COURT OF THE UNITED STATES.

OCTOBER TERM, 1886.

ADDITION TO RECORD.

THE PARKER & WHIPPLE COMPANY *et al.*, Appellants,
vs.
THE YALE CLOCK COMPANY *et al.*, Appellees. } No. 204.

Appeal from the circuit court of the United States for the district of Connecticut.

It is hereby stipulated that the record in the above-entitled cause be amended by adding thereto a copy of the complainants' exhibit of reissued letters patent granted to Arthur E. Hotchkiss Mar. 14, 1882, and marked "complainants' letters patent" (fol. 30, p. 13), and also a copy of the Defendants' Exhibit "Hotchkiss Original Patent" (fol. 254, p. 154), being the original letters patent granted to said Arthur E. Hotchkiss Nov. 4, 1879, and the clerk of said court is requested to print the same (including the drawings) as part of the record of said cause.

JOHN K. BEACH,
Solicitor for Appellants.
C. R. INGERSOLL,
Solicitor for Appellees.

Exhibited in circuit court.
Attest: E. E. MARVIN, *Clerk.*

(2—175.)

DEPARTMENT OF THE INTERIOR,
UNITED STATES PATENT OFFICE.

To all persons to whom these presents shall come, Greeting:

This is to certify that the annexed is a true copy from the records of this office of the specification and drawing in the matter of the reissue letters patent granted Arthur E. Hotchkiss March 14, 1882, number 10062, for improvement in clock movement.

In testimony whereof I, E. M. Marble, Commissioner of Patents, have caused the seal of the Patent Office to be affixed this 11th day of May, in the year of our Lord one thousand eight hundred and

eighty-three, and of the Independence of the United States the one hundred and seventh.

[Seal Patent Office, United States of America.]

E. M. MARBLE,
Commissioner.

(11841—10000.)

(Here follow diagrams, marked pp. 3 and 4.)

UNITED STATES PATENT OFFICE.

ARTHUR E. HOTCHKISS, of Cheshire, Connecticut.

Clock-Movement.

Specification forming part of reissued Letters Patent No. 10062, dated March 14, 1882. Original No. 221,310, dated November 4, 1879; reissue No. 9656, dated April 12, 1881. Application for reissue filed July 19, 1881.

To all whom it may concern:

Be it known that I, Arthur E. Hotchkiss, of Cheshire, in the county of New Haven and State of Connecticut, have invented certain new and useful improvements in clock-movements, of which the following is a description:

My invention relates to an improvement in clock-movements, the object being to make a clock-movement which shall be simple and durable in its construction, of small initial cost in manufacture, and the several parts of which shall be relatively arranged in such manner that the movement may be inclosed in a small and compact case.

To this end the invention consists essentially in dividing the train into two parts; in arranging the divisions of the train in a frame having three plates; in providing an additional wheel and pinion between the escape-wheel and center wheel; in making the three wheels between the escape-wheel and center wheel with the same number of teeth and of the same size; in arranging the pivots of the three arbors carrying the three like wheels and pinions between the escape-wheel and center wheel in the circumferences of circles which are concentric with the center arbor, and in other minor improvements as the invention is hereinafter more fully described and explained by reference to the drawings.

In the accompanying drawings, figure 1 is a perspective view of the movement as it is arranged in the case. Fig. 2 is an elevation of the back of the clock-case. Fig. 3 is a view of the mainspring and hub to which the inner end of the spring is attached, and of the back plate and posts by which the movement is attached to the case, to one of which the outer end of the spring is attached. Fig. 4 is a section of the back and middle plates, and of the rotating disk and its hub. It shows also two of the posts for attaching the movement to the case; also two of the pillars for connecting the front plate to the middle plate and a portion of the rack. Fig. 5 is a front view of the recessed circular rack and middle plate in position. Fig. 6 is a view of the

front and middle plates and the pillars by which they are connected. Fig. 7 is a view of the pawl or dog attached to the center wheel, of the ratchet-wheel, center pinion, and center arbor. In Fig. 8 are two views of a dial. Fig. 9 is a view of a minute-hand. Fig. 10 is a view of the key. Fig. 11 is a view of the pendulum, of the device for holding the ball against the adjusting-nut, and of the verge. Fig. 12 is a view of a guide for the pendulum-ball. Fig. 13 is a view of portions of the rotating disk and rack, of the center pinion, and planet-wheel for connecting the rack with the center pinion.

To enable others to make my improved movement in the way contemplated, I will describe its several parts in detail, and also the means by which the movement is attached to the case.

The frame of the movement is made with three plates, a front, middle, and back plate, the front and middle plates being connected by pillars, and the middle and back plates by the rack. The front plate, K, and the middle plate, J, Fig. 6, are punched from sheet metal, and are "open plates," as this kind of plates are called—that is, they are punched with such parts only as are requisite for the support of the train and for connecting the plates. The middle plate, J, is punched with projections which are bent at right angles to the plate, and form sheet-metal pillars J′. The front ends of these pillars are narrower than their other parts, and shoulders are thus formed on the pillars. These narrow ends pass through slots in the front plate, K, and are twisted to hold the plate against the shoulders. The back plate, C, Figs. 3 and 4, is a circular sheet-metal plate, and is punched with projections which are bent at right angles to the plate and form sheet-metal posts C′. The rear ends of these posts are narrower than their other parts, and shoulders are thus formed on the posts. These narrow ends pass through slots in the back of the case, and are bent downward to hold the movement to the case, as shown in Fig. 2. On one of these posts a side piece, *c′*, Fig. 4, is formed, which is bent, and forms a pin to which the outer end of the mainspring is attached in the usual manner. These posts not only hold the movement to the case, but perform the function of the outer part of a mainspring-barrel, in that they hold the spring when it is unwound. The middle plate, J, is connected to the back plate, C, in the following manner: The rack D has a recess, *g*, Fig. 4, formed in its front side, which is a little deeper than the thickness of the middle plate, J. Into this recess the middle plate fits and is placed. The edge of the recess is set over the plate and holds it to the rack. The back plate, C, is placed in a like recess on the rear side of the rack, and is held to the rack in the same manner. It will be noticed that the rack answers the purpose of pillars, in that it connects the middle plate, J, to the back plate, C.

The train of the movement consists of the center wheel, E′, escape-wheel and pinion on its arbor, the three like wheels with the pinions on their arbors between the center wheel and escape-wheel, and of the center pinion, *e*, and rack D, which are connected by the planet-wheel E. The train is divided into two parts between the center wheel and center pinion—that is, the center wheel, escape-wheel, and pinion on its arbor, the three wheels with the pinions on

their arbors, between the center wheel and escape-wheel, are arranged between the front and middle plates of the frame and constitute the front part of the train, and the center pinion and rack, which are connected by the planet-wheel, are arranged between the middle and back plates and constitute the back part of the train, the two parts being connected by the center arbor, H, on which are arranged the center wheel and center pinion, and which extends through the front plate and middle plate to the hub G in the back plate, the hole in the middle plate being large enough to allow the center pinion to pass through it.

The escape-wheel has thirty-eight teeth, each of the three like wheels between the escape and center wheels has thirty-two teeth, and the center wheel has twenty-six teeth. The rack has sixty teeth and the planet-wheel has twenty-six. The center pinion has ten leaves and all the other pinions have eight leaves each and the same diameters. The three wheels between the escape and center wheels are of the same size, and the pivots of the arbors on which they are placed and the pivots of the escape-wheel arbor are arranged in the circumferences of circles which are concentric with the center arbor, and are also arranged within a semicircle and in a manner to bring the escape-wheel arbor near the top of the frame.

The center arbor, H, extends through and turns in the front plate, and the minute-hand is attached to its front end, its back end turning in the hub G in the back plate, C. The center wheel, E′, and the center pinion, *e*, are arranged and are free to turn on the center arbor, the wheel being arranged between the front and middle plates, and the pinion between the middle and back plates. Between a shoulder on the arbor and a center wheel a spiral spring is placed which creates friction enough between the arbor and center wheel to turn the arbor, dial-work, and hands, and allows the hands to be moved and set to the right time. On one end of the center pinion the ratchet-wheel V, Fig. 7, is rigidly attached, and the center pinion comes against a shoulder on the arbor back of the pinion. The pawl U, Fig. 7, is pivoted to the center wheel, is nearly semicircular in form, and resembles a verge in a recoiling escapement. It extends nearly half-way round the ratchet-wheel, and the direction of the force of the ratchet in its forward motion is between an end of the pawl and its pivot, and the ratchet forces the ends of the pawl in and out of the teeth of the ratchet alternately, one of the two ends of the pawl being constantly back of a tooth of the ratchet. In its backward motion the ratchet has no action on the pawl, and a tooth of the ratchet comes against an end of the pawl and prevents the turning of the ratchet.

The circular rack D, Figs. 5 and 13, has teeth cut on its inside, and forms a part of the frame and also a part of the train, as before mentioned. The circular rotating disk F is punched from sheet metal and has a central perforation. The small end G′ of the hub G is passed through a central opening in the back plate, C, into the central perforation in the disk, and is soldered to the disk. The disk and hub are thus united, are held to the back plate, and are free to turn in the same. The hub G has a central perforation, in

which the rear end of the center arbor turns. The perforation in the rear part of the hub is enlarged and is threaded. Into the large end of the hub G a pin is inserted, which forms the usual fastening for the inner ends of mainsprings. The planet-wheel E turns on a stud in the circular disk F, and connects the rack with the center pinion.

The verge and pendulum arbor is shown in Fig. 1, and is supported on sharp edges or points. This mode of hanging a pendulum was patented to me on November 28, 1876, and to this patent I refer for a full and accurate description of this manner of hanging a pendulum. The pendulum-rod is formed to clear the arbors between the front and middle plates, and has its lower end threaded and provided with an adjusting-nut in the usual manner. On the lower end of the rod the plate S, Fig. 12, is suitably fastened, which is a straight bar with a perforated part, *s*, formed on one of its sides near the middle of the bar. In the back of the pendulum-ball a slot is formed. The rod passes through the ends of the slot, through the perforation in the plate S, and through a spiral spring placed in the slot into the adjusting-nut. This device prevents the turning of the ball on the rod and forces it against the adjusting-nut, and is shown in Fig. 11.

The mainspring B is the ordinary spring used in movements, and is attached to the hub G and to a post in the back plate, C, in the usual and well-known way. It is centrally arranged in the frame, and the room for its expansion varies with the size of the back plate, C.

The key is a short, round rod, one of its ends being turned down and threaded, leaving a shoulder, as shown in Fig. 10. The threaded end is made to fit the threaded perforation in the hub G. Through the large end a small rod passes and forms arms by which it is turned. In the end of one of these arms a rectangular recess is formed, which fits the back end of the center arbor and the adjusting-nut on the pendulum-rod, and constitutes the means by which these parts are reached without opening the case of the clock.

The dial-work in my movement is the common dial-work in clock-movements, is well known to clock-makers, and needs no description. The same is true of the dial and hands.

In Fig. 2 the back of the case is shown, and in Fig. 1 the back and bottom, with the opening a^2 in the bottom, the back and bottom being made of a single piece of sheet metal.

By the construction of the several parts of the movement and their arrangement, as above described, coarse teeth, large pinions, and pivots may be used, and the movement will give as good results and occupy as little space as ordinary movements with fine and expensive work.

In this specification, the expressions "frame," "escape-wheel," "escape-wheel arbor," "center wheel," "center pinion," and "center arbor" are used in their well-known and technical sense—viz., "frame" denotes the plates, suitably connected, between which the wheels and pinions are arranged, and in which the arbors turn; "escape-wheel" denotes the wheel the teeth of which act on the

pallets; the "escape-wheel arbor" the arbor to which the escape-wheel is fastened; "center arbor" the arbor to which the minute-hand is attached, and which is centrally arranged in respect to the dial; and "center wheel" and "center pinion" denote the wheel and pinion which are arranged on the center arbor and form parts of the train, as distinguished from a wheel or pinion on the center arbor (often found in American clocks) which form a part or parts of the dial-work.

I am aware that the frames of movements have been made with three plates adapted to secure particular results, and I am aware that the trains of movements have been divided (in the sense in which I use the word—that is, parts of trains have been arranged between different plates, but not disconnected), and that elongated pinions have been made to pass through back plates into bridges attached to the plate and mesh with wheels held in a similar way; but

What I claim as my invention is—

1. In a clock movement having a frame consisting of three plates suitably connected together, a train which is divided into two parts, a front part and a back part, the front part arranged between the front and middle plates of the frame, and the back part arranged between the middle and back plates of the frame, the point of division being between the center wheel and center pinion, the said center wheel and center pinion being arranged on the center arbor carrying the minute hand, as set forth.

2. In a clock-movement having a frame consisting of three plates suitably connected together, the middle plate of the frame, the said middle plate dividing the train into two parts between the center wheel and center pinion, the said center wheel and center pinion being arranged on the center arbor carrying the minute-hand, as set forth.

3. In a clock-movement, a frame consisting of three plates suitably connected together, the middle plate of which divides the train into two parts between the center wheel and center pinion, the said center wheel and center pinion being arranged on the center arbor carrying the minute-hand, and the frame having the parts of the divided train arranged between its three plates, as set forth.

4. In a clock-movement having a frame consisting of three plates suitably connected together, a center arbor carrying the minute-hand and provided with a center wheel and center pinion, the wheel arranged between the front and middle plates of the frame, and the pinion arranged between the middle and back plates of the frame, as set forth.

5. The improvement in a clock-train, consisting of three wheels suitably fastened on arbors carrying pinions, and arranged between the escape-wheel and its arbor carrying a pinion, and the center arbor carrying the center wheel and center pinion, as set forth.

6. The improvement in a clock-train, consisting of three wheels having the same number of teeth and the same diameters, suitably fastened on arbors, the pivots of which are arranged in the circumferences of circles concentric with the center arbor, the several arbors

carrying pinions having the same number of leaves and the same diameters, all the said parts arranged between the escape-wheel and its arbor carrying a pinion, and the center arbor carrying the center wheel and center pinion, as set forth.

7. The improvement in a clock-train, consisting in the arrangement of the pivots of the escape-wheel arbor and of the pivots of the three arbors carrying the three wheels and the three pinions between the escape-wheel arbor and the center arbor carrying the center wheel and center pinion in a semicircle, as set forth.

8. In a clock-movement, the combination, with a train divided into two parts, a front part and a back part, by the middle plate of a frame having three plates, the division being made between the center wheel and center pinion, the said center wheel and center pinion being arranged on the center arbor carrying the minute-hand, the escape-wheel being arranged in the front part of the train and near the top of the frame, and the pivots of the front part of the train being arranged within a semicircle of a pendulum attached to an arbor near the top of the frame and vibrating in a plane passing between the front and middle plates of the frame, as set forth.

9. In a clock-movement provided with a circular rack, the circular disk F, rotated by the mainspring and carrying the planet-wheel E only, which connects the rack with the center pinion, as set forth.

10. In combination with a pendulum-rod provided with the plate S, fastened to the rod, a spring arranged on the rod to hold the pendulum-ball against the adjusting-nut, as set forth.

ARTHUR E. HOTCHKISS.

Witnesses:
GEORGE TERRY.
EARL BROWN.

[Endorsed:] Patent No. 10062. Filed June 22, 1883. E. E. Marvin, clerk.

Exhibited in the circuit court.
Attest: E. E. MARVIN, *Clerk.*

(2—175.)

DEPARTMENT OF THE INTERIOR,
UNITED STATES PATENT OFFICE.

To all persons to whom these presents shall come, Greeting:

This is to certify that the annexed is a true copy from the records of this office of the specification and drawing in the matter of the letters patent granted Arthur E. Hotchkiss November 4, 1879, number 221,310, for improvement in clock movements.

In testimony whereof I, E. M. Marble, Commissioner of Patents, have caused the seal of the Patent Office to be affixed this 11th day of May, in the year of our Lord one thousand eight hundred and

eighty-three, and of the Independence of the United States the one hundred and seventh.

[Seal Patent Office United States of America.]

E. M. MARBLE,
Commissioner.

(Here follow diagrams marked pp. 10 and 11.)

UNITED STATES PATENT OFFICE.

ARTHUR E. HOTCHKISS, of Cheshire, Connecticut.

Improvement in Clock-Movements.

Specification forming part of Letters Patent No. 221,310, dated November 4, 1879; application filed July 29, 1879.

To all whom it may concern:

Be it known that I, Arthur E. Hotchkiss, of Chesire, in the county of New Haven, and State of Connecticut, have invented certain new and useful improvements in clock-movements; and I do hereby declare that the following is a full, clear, and exact description of the invention, which will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to letters of reference marked thereon, which form a part of this specification.

This invention relates to that class of time-keepers in which a fixed annular rack or internally-toothed wheel is employed to aid a spring-barrel in rotating the tram of wheels.

The nature of said invention consists, partly, in the combination of a fixed internally-toothed circular rack and a concentric going barrel or plate with a mainspring, a transmitting-wheel rotating with said barrel, and a fixed clock-movement.

It also consists in arranging the operating parts of the time-piece on a fixed plate and attaching the same to the back of the clock-case by means of tongues which extend out from said plate through perforations in the back of said case.

It also consists in providing said tongues with broad shoulders, which cause said plate to stand out from the back of the clock-case, so as to leave space for the mainspring between them.

It also consists in the combination of a mainspring having a perforated end with a lateral finger extending from the broad part of one of said tongues, whereby said mainspring is firmly held at its fixed end, yet easily detached.

It also consists in the combination, with a fixed plate, which confines the mainspring and supports the movement of a rotating plate arranged in front of said fixed plate, and provided with a hub which extends through said fixed plate and is connected to the winding end of the mainspring.

It also consists in adapting to and combining with the hub thus constructed a key having a screw-threaded winding part for engag-

ing with said hub and a recessed part for engaging with the prismatic end of the center shaft.

It also consists in constructing the annular rack or internally-toothed wheel with an annular recess for receiving the pillar-plate and thereby economizing space.

It also consists in constructing the pillar-plate and pillars in one piece, and attaching said pillars to the front plate by twisting them.

It also consists in substituting an automatic winding-dog, opering like an escapement-verge, for the click and spring ordinarily used.

It also consists in constructing the case with an opening at the bottom and adapting the key and the adjusting-nut of the pendulum-ball to one another, so that the adjustment of the said ball may be effected conveniently from outside of the case.

It also consists in providing said ball with a spring which will force it down into place, and with a guide which will prevent it from turning.

In the accompanying drawings, figure 1 represents a front perspective view of a clock embodying my invention, the front of the case and also the dial-plate having been removed. Fig. 2 represents a rear elevation of the case, showing the method of attaching the works thereto. Fig. 3 represents a rear detail view of the mainspring and the plate to which it is attached. Fig. 4 represents a detail sectional view of the fixed plate, the rotating plate, the pillar-plate, and the toothed ring or circular rack, showing the hollow winding-hub. Fig. 5 represents a front perspective detail of the recessed circular rack, with the rear pillar-plate in position. Fig. 6 represents a detail view of the front and rear pillar-plates and pillars in position, showing the method of attaching the front pillar-plate to the pillars. Fig. 7 represents a detail view of my automatic winding-dog applied on the center wheel and shaft. Fig. 8 represents a front view of my dial-plate, showing the method of attachment of said plate to the front pillar-plate and of the dial to said dial-plate. Fig. 9 represents a detail view of the slotted automatically-adjustable minute-hand. Fig. 10 represents a detail view of the key. Fig. 11 represents a detail view of the pendulum. Fig. 12 represents a detail view of the pendulum-ball guide-plate. Fig. 13 represents in detail the transmitting-wheel and adjacent parts.

Most of these details are enlarged from the scale of Fig. 1, to exhibit more plainly the smaller features of the device.

In said drawings, A designates the back of the clock-case, and A′ the bottom thereof. This case is made, preferably, of sheet metal, which may be nickel-plated, if desired; and the said back is constructed with a central opening, *a*, to receive the winding-hub, hereinafter dscribed, and with smaller openings *a′* near the sides to receive the tongues, hereinafter described, whereby the works are fastened to the case. The said case-bottom A′ is provided with an opening, a^2, which allows the entrance of the key to adjust the pendulum-ball. The construction of the clock-case and the adaption of the works thereto allow the clock to be wound, set, and regulated without opening the case.

B designates the mainspring, and C a fixed disk or plate, which holds the same in position between said plate and the back of the clock. Said mainspring occupies the whole back of the space occupied by the works, so as to give the greatest running power with the least possible expense of room, one of the leading objects of my invention being to render it possible to make a cheap, neat, and satisfactory time-piece of unusally small size. Many of the features of said invention are, however, applicable to large clocks or other large time-pieces as well.

The said plate C forms a sort of base-plate or attaching-plate for all the works of the watch, so that when it is detached from the watch-case all of said works will come off with it. The attachment of said plate to said case is effected as follows: C′ designates four or more short flanges formed in one piece with plate C, and terminating in square shoulders, which rest against the back A. These flanges are formed with narrow rearwardly extending tongues or cláws *c*, which pass through said openings *a′* in said clock-case back, and are bent on the outside thereof, so as to clamp said plate and its attachments in place. These tongues or claws *c* have sufficient strength to hold the light works permanently in position, but they are readily straightened to allow the separation of works and case for cleaning and other purposes.

The flanges C′ answer the same purpose as the sides of an ordinary watch-barrel in holding the expanding mainspring in place, and the fixed end of said mainspring B is attached to one of said flanges by means of a perforation in said spring, which sits over a finger, *c′*, formed on the side of said flange. This connection, though firm, allows easy and speedy detachment. The spaces between flanges C′ allow the spring B to be conveniently inspected.

On said fixed plate C, and extending considerably above the periphery of the same, is permanently secured a fixed internally-geared ring or circular rack, D, which meshes with and gives motion to a gear-wheel, E, carried by a rotating plate, F, which is similar in form to plate C, and rests against it. These plates are concentric, and plate F is somewhat smaller than plate C. Plate F is provided with a central hollow hub, G, attached to a short hollow cylindrical bearing, G′, which extends through a central opening of plate C. To the outside of this hub the winding and operating end of mainspring B is attached. Thus the said mainspring operates to rotate said plate F. The wheel E, carried by said rotating plate, is journaled on a rivet or headed stud formed with or attached to said plate. This method of attachment and journaling is very strong and secure, and, besides, avoids all necessity for an additional bearing or brace for the pivot-shaft. The said wheel E is in effect an idle-wheel, transmitting the action of the cogs in the stationary geared ring or circular rack to a pinion, *e*, on the center-shaft, H, and the train of wheels I. The center-shaft has its outer bearing in the cylindrical piece G′, and its inner bearing in the fixed front plate, hereinafter described, so that it does not turn with plate F, but is stationary with relation thereto. The remaining wheels of the train or movement are also stationary with reference to the

motion of said plate, being pivoted in the front and rear with plates J and K. The only wheel which does not have a stationary axis is the transmitting wheel E, whose function is simply that of an idle-wheel. By making the movement stationary instead of causing it to be carried around by the revolving plates (as movements have heretofore been carried by going-barrels operated with a fixed rack), I avoid divers practical difficulties of manufacture incidental to the construction and use of so many wheels having moving axes and compound revolution. Moreover, I thereby adapt the movement to be used with a pendulum, which would otherwise be practically impossible, as the pendulum cannot well be made to revolve.

The construction of the plates C and F and of the attached parts gives to my time-piece the combined advantages of a fixed barrel and a going-barrel. The fixed plate C effectually braces the revolving plate F, and the latter has no need of the flanges or side-pieces found in an ordinary going-barrel. It is obvious, however, that said revolving plate F may be furnished with such flanges, if desired. This plate F is protected at the side by the circular rack D, and in front by the pillar-plate J. This pillar-plate is at a sufficient distance from said rotating plate to allow space for the transmitting-wheel E and the center pinion, with which it meshes. To enable said pillar-plate to be thoroughly braced by said rack, and also fit the parts together in the smallest possible space, the said rack is constructed with an internal annular recess, *g*, in its rear edge or corner. Said pillar-plate J is set into this recess.

The pillars J′ are formed in one piece with said pillar-plate J, and, preferably, by striking up out of sheet metal. Each pillar terminates in square shoulders *j*, which abut against the rear side of front plate, K, and short arms or tips *j′*, which extend through holes *k* in said plate K. By twisting said tips said front pillar-plate is clamped to said pillars. This twisting may be effected by any convenient tool. When said tips are bent back again so as to be straight there is no difficulty in separating the pillar-plates.

My front plate, K, is provided with a fixed pin, L, which extends forward, so as to pass through a perforation, *m*, in the dial-plate M, so as to prevent said dial-plate from having rotary motion.

The dial N is attached to dial-plate M by an eyelet, O, which is struck up forward from the center of said plate and bent back upon said dial. Said eyelet is in one piece with said dial-plate. By having said eyelet in one piece with said dial-plate the danger of losing said eyelet is entirely obviated and the number of separate parts lessened. The dial-plate itself is held against the ends of the pillars by the hands of the watch, which are arranged and attached as usual, with the following exception: The center-shaft should be perfectly cylindrical, so as to exactly fit the hole in the minute hand P; but, in practice, some irregularity of shape in said shaft is frequently met with. To obviate this difficulty the inner end of the hand is slotted or split from the hole outward at *p*, as shown in detail in Fig. 9, the said hand being made of elastic material. The elasticity of the hand thus split will cause it to grasp tightly a shaft which is not a perfectly true cylinder, so that the hand will retain

its proper place. This construction thus forms an automatic adjustment for said hand. Of course, both hands may be constructed in this way.

Of course many of the features of my improved time-keeper may be used in a marine clock or other horological device, which does not include a pendulum. In the accompanying drawings I have, however, shown a pendulum hung upon a knife edge and designated Q. As the peculiar method of hanging said pendulum is sufficiently covered by an earlier patent of my own, I need not describe it more particularly here.

The ball R of this pendulum is adjusted up and down on the rod R′ thereof by the nut *r*, to regulate the length of its oscillation and insure the proper action of the verge on the escapement. This nut *r* is made of the same size as the prismatic end of the center-shaft, so as to be operated by the same recessed arm *t* of the key T (shown in detail in Fig. 10). This arm *t* is passed up through the opening in the bottom of the clock case hereinbefore described, so that the clock can be regulated readily without opening said case.

Said pendulum Q is shown in detail in Fig. 11. Its ball R is provided with a long vertical recess, *r*′, through which rod R′ passes. Said rod is surrounded within said recess by a helical spring, r^2, which bears at its upper end against a guide-plate, S, fixed to said rod R′, and at its lower end against said ball R. The effect of said spring is to hold said ball down to its proper place against nut *r*.

The construction of guide-plate S is clearly shown in detail in Fig. 12. It consists of a middle part, *s*, which extends into recess *r*′, and of straight wings *s*′, which extend on each side along the face of flattened ball R. These wings prevent said ball from turning on said rod. Such turning would cause unnecessary wear, and would interfere with the accuracy of the pendulum action.

The clock is wound by means of key T and hub G. Said hub is internally screw-threaded, and extends to the outside of case back A, through opening *a*. Key T is **T**-shaped and provided with a screw-threaded extension, T′, which fits the threads of said hub. When the clock is to be wound said extension is screwed into said hub. As soon as said extension is screwed quite home the next turn of the key in the same direction causes the winding of the mainspring to begin. As soon as the winding is complete the said key is turned in the opposite direction, so as to unscrew said extension, and thus detach said key. To set the hands, the prismatically recessed arm *t* of said key is inserted in hollow hub G, and pressed back till it engages with the prismatic end of the center shaft. The use of this arm for regulating the vibration of the pendulum has already been described. It will be evident that this key is thus susceptible of a triple use.

The back plate, A, and bottom plate, A′, of the clock case are made in one piece. This construction enables me to conveniently disclose the working of the mechanism while the clock is in position for use. I simply remove the remainder of the case. The bottom A′ then supports the back A and the parts attached thereto, which comprise all the works and the dial of the clock. The wheels,

spring, and pendulum are then easily accessible from all quarters, and any obstruction or imperfection will be readily perceived. In many cases the mechanism may be cleaned or mended without taking it to pieces, and its working may be conveniently exhibited.

Instead of the ordinary winding pawl or dog pressed by a spring against the ratchet-teeth, I employ an automatic verge-like dog, U (shown in detail in Fig. 7). This dog is pivoted to the center wheel E′, and has an impulse pallet that is curved slightly inward, and a detent pallet which has an inwardly-extending nose or point. The inclined part of each tooth on ratchet V acts to press outward said impulse-pallet, and thereby to force inward the other or detent pallet. The latter is thus kept in such position as to catch one of the teeth of said ratchet on the first reverse movement of said ratchet and shaft. As there is no spring-pressure on said dog U, it yields very readily to the motion of its ratchet in winding, and it does not make the disagreeable clicking sound which is made by an ordinary spring-pressed pawl.

The hand P may be constructed with any other suitable elastic attaching end instead of the slotted one shown. The latter construction is, however, preferred.

Having thus fully described my invention, what I claim as new, and desire to secure by letters patent, is—

1. In combination with a fixed circular rack and a stationary clock-movement, a plate rotated by the mainspring and carrying a device which connects the rack and movement, substantially as and for the purpose set forth.

2. A perforated clock-case back, in combination with a base-plate for the movement, said base-plate being provided with flexible claws, which may pass through the perforations in said clock-case back, substantially as and for the purpose set forth.

3. In combination with mainspring B, perforated at *b*, the lateral attaching-finger *c* on flange C′ of plate C, said parts being constructed and applied substantially as and for the purpose set forth.

4. In combination with mainspring B, the fixed plate C and its flanges C′, forming a barrel for said spring, but allowing inspection of the latter between the flanges C′, substantially as set forth.

5. In combination with mainspring B and fixed plate C, the rotating plate F and its hub G, said hub extending through plate C for the attachment of the spring, substantially as set forth.

6. In combination with ratchet V, a verge-like automatic winding-dog U, held in proper position for catching by the forward motion of said ratchet.

7. In combination with a pillar-plate, a fixed circular rack having an annular inner recess to receive said plate, whereby said rack serves also the purpose of attaching said plate, and the said parts are made to occupy the least possible space.

8. In combination with a perforated front plate, a rear pillar-plate, having twisted tongues on the ends of its pillars, whereby said plates and pillars are clamped together, substantially as set forth.

9. In combination with a pendulum-rod and adjustable pedulum-

ball, a spring arranged to force said ball down against the adjusting-nut.

10. In combination with a pendulum-rod and an adjustable pendulum-ball, a spring fitted into a recess of said ball and operating to force the latter down against the said nut.

11. In combination with the adjusting-nut of a pendulum, a clock-case bottom, perforated at A^2, and a key having a prismatic recess fitting said nut, whereby the height of the pendulum-ball may be adjusted by the key from the outside of the clock-case, substantially as set forth.

12. In combination with a hollow internally-threaded winding-hub, G, a key having a screw-threaded portion for engaging with said hub, and a prismatically-recessed portion for passing through said hub and engaging with the center shaft.

In testimony that I claim the foregoing as my own I affix my signature in presence of two witnesses.

ARTHUR E. HOTCHKISS.

Witnesses:

M. C. DOOLITTLE.

GEO. G. SCRANTON.

[Endorsed:] Supreme Court U. S. 1886, October term. No. 204. The Parker & Whipple Company *et al.*, app'ts, *vs.* The Yale Clock Co. *et al.* Stipulation of counsel & addition to record.

[Stamped:] Office Supreme Court U. S. Filed Feb. 18, 1887. James H. McKenney, clerk.

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SUPREME COURT OF THE UNITED STATES.

OCTOBER TERM, 1887.

IN EQUITY.

THE PARKER & WHIPPLE COMPANY AND ARTHUR E. HOTCHKISS, Appellants,

vs.

THE YALE CLOCK COMPANY AND HENRY C. SHELTON, FREDERICK A. LANE, AND PASCHAL CONVERSE, Appellees.

BRIEF FOR APPELLANTS.

CHARLES E. MITCHELL,
JOHN K. BEACH,
Of Counsel.

The Case, Lockwood & Brainard Co. Print, Hartford, Conn.

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Supreme Court of the United States.

October Term, 1887.

IN EQUITY.

THE PARKER & WHIPPLE COMPANY et al., Appellants,

vs.

THE YALE CLOCK COMPANY et al., Appellees.

Appeal from the Circuit Court of the United States for the Second Circuit, and for the District of Connecticut.

BRIEF FOR APPELLANTS.

STATEMENT.

This suit was brought upon reissued letters patent No. 10,062, dated March 14, 1882, to Arthur E. Hotchkiss, for certain new and useful improvements in clock movements. The application for the reissue was filed July 19, 1881.

The original patent bore date November 4, 1879, and was numbered 221,310.

An intermediate reissue bore date April 12, 1881, and was numbered 9,656. The application for this intermediate reissue was filed January 22, 1881.

The Parker & Whipple Company are exclusive licensees under the original and reissued patents. Said Parker & Whipple as such licensee began to make clocks and employed the defendants to construct for it clock movements in large numbers, containing and embodying the Hotchkiss inventions, the appellant furnishing the necessary dies and paying the appellees for such service. For a time the appellee faithfully executed its contract, making and delivering about fifty thousand clocks to the appellant company. It soon, however, began to use and duplicate the dies of the appellant to produce clock movements containing and appropriating the inventions of Hotchkiss in all their leading features for use in clocks to be sold on the market in competition with the Hotchkiss clock. The clocks made by the appellee company, with Parker and Whipple's tools, for Parker & Whipple was called the "Little *Jewel.*" The clock made by the defendant company with duplicates of Parker & Whipple's tools, to be sold in competition with the "Little Jewel," was called "Yale *Gem.*" The appropriation of the Hotchkiss invention was so complete that the wheels and pinions and other rotating parts of the movement made by the appellee company for itself and used in the "*Gem*" were interchangeable with the wheels and pinions and other rotating parts made by the appellees for the appellants to be used in the "*Jewel.*" The clock thus made by the appellees infringed the first reissue, but that reissue was found defective and hence a second one was obtained. (Terry Dep. Rec., p. 93, R.-D. Int. 197.)

The appellees continuing to infringe, a bill was filed March 27, 1882, for an injunction and account.

The answer, duly filed, denied the validity of the reissued letters patent, denied infringement, and also averred want of patentable novelty. It also denied the fraud upon the invention of Hotchkiss which the bill averred.

It appears by Judge Shipman's opinion (Rec., p. 174) that the court below "assumed that the invention as claimed in the reissue was both novel and patentable" (Rec., p. 175), and found that "the defendants infringe the first eight claims" (Rec., p. 177), but holds the reissue to be void, *not by reason of laches in applying for it*, but because the reissue is not for the same invention as the original patent within the meaning of the statute authorizing reissues. After discussing this question at some length the opinion closes with these words:

> "I am not unmindful of the strong equities in favor of the plaintiffs growing out of the error of the inventor in regard to the nature of his invention and of the fact that Mr. Lane availed himself of the error in a manner and by an expedition which indicated that he was more intent upon commercial success than upon nice observance of the golden rule; but I am clearly of opinion that the statute in regard to reissues forbids such a radical transformation of a patent as was attempted in this reissue."
>
> (Rec., p. 178.)

ASSIGNMENT OF ERRORS.

The court below erred in holding that the reissue was void for departure of invention from the original patent and should have held that the matters contained in the first eight claims of the reissued patent

belonged to the "same invention" as the invention of the original patent.

The court below erred in decreeing a dismissal of the bill after refusing to sustain any of the defenses set up, excepting the defense of want of sameness of invention as between the original and reissued patent, and should have decreed an injunction and an account.

POINTS OF LAW AND FACT.

This court has often had occasion to lay down the law applicable to a *belated reissue* set up against *a good faith infringer*, and it may be said, and once for all, that if this appeal turned upon that question it would not be here.

The object of this appeal is to ascertain the law applicable to a *seasonable reissue* set up against a *bad faith infringer*.

It is conceded at the outset that expanded claims, even within the limits of the original invention, are void if the application for correction is unreasonably delayed, as was held in *Miller* vs. *Bridgeport Brass Co.*, 104 U. S., 350, and in several other cases that are too familiar to need citation.

It is conceded at the outset that even when an application for correction is seasonable the limitation to sameness of invention can not be overstepped, because it is statutory and imperative.

It is conceded at the outset that the rule requiring sameness of invention is overstepped when a patent

for a *process* is reissued into a patent for a *composition* which is not the result of the process, as was held in *Powder Co.* vs. *Powder Works*, 98 U. S., 126.

It is conceded at the outset that the rule requiring sameness of invention is overstepped when a patent for a machine is reissued for a process of operating that class of machines, as was held in *James* vs. *Campbell*, 104 U. S., 356; *Heald* vs. *Rice*, 104 U. S., 737, and in *Wing* vs. *Anthony*, 106 U. S., 142.

It is conceded at the outset that the rule requiring sameness of invention is overstepped when "new matter" is introduced, that is to say, "substantive new matter such as would have the effect of changing the invention or of introducing what might be the subject of another application," as was held in *Powder Co.* vs. *Powder Works*, 98 U. S., 126, 138.

But we do not concede that the correction can not be commensurate with the mistake when the reissue is applied for seasonably and before good-faith interests of an adverse character have accrued. Much less do we concede that a bad faith infringer can plead a mistake in the original patent as against the remedial efficacy of a statute whose very object is to relieve against such a mistake.

What, then, is the nature of the Hotchkiss invention; and in what relation does his original and reissued patent stand to his real invention; and did the court below err in holding that that reissued patent transcended the limits of the invention of the original patent?

THE NATURE OF THE INVENTION.

The object and general features of this improvement in clocks, are well set forth by Mr. James Shepard, one of appellants' experts.

"*Int.* 4. Describe what you understand to be the improvement in clock movements set forth in said reissued letters patent.

"*Ans.* The object of the improvements is to arrange the several parts of the movement in such manner that they may be enclosed in a small and compact case, and at the same time so that they shall be durable in construction, and made as cheaply as ordinary clock movements. To this end the main features of the invention may be stated generally to consist of dividing the train into two parts by means of a frame having three plates: the center shaft which revolves once an hour being longer than the rest of the shafts, and extending into both divisions of the frame; the center pinion and the gears which drive it being located upon one side of the middle plate of the frame, and the center wheel, which revolves once an hour, and carries the minute-hand, and which drives the remainder of the train, is arranged upon the opposite side of the said middle plate.

"The invention also consists of this center arbor carrying this center wheel and center pinion and three other wheels arranged between said center wheel, and the escape wheel; also in arranging the three wheels which are driven by this center wheel in the circumference of a circle which is concentric to the center arbor; also in arranging these three wheels on a semi-circle concentric to the center pinion, and combining them with the pendulum hung near the top of the frame, and swinging within the space upon the side of the center arbor which is opposite to the wheels arranged in a semi-circle:"

(Record, page 14.)

These features are the ones in controversy, and they enter into the first eight claims of the patent. Reserving a full description of the details of mechanism to the discussion of the issue of infringement further on in the brief, we content ourselves with remarking here, that Mr. Hotchkiss succeeded by a number of very ingenious arrangements and combinations, in producing by far the smallest time-piece that was ever made, in which the leaves of the pinions, the teeth of the wheels, and the bearings of the arbors are of the size employed in ordinary clock movements. In short, he made a clock upon the general plan as to size of a watch, by newly arranging and combining the parts of the movement of a clock *instead of by reducing the size of the wheel teeth, pinion leaves, and arbor bearings, as had always before been done in making time-pieces of a corresponding size.*

Here we pause to say that in the year 1879 the defendants were engaged in clock making, having been organized for that purpose in the same year. Up to the date first mentioned, they had produced two kinds of clocks, known as the "Yale No. 1," and the "Grandfather." Neither of these clocks belonged to the class of tiny clocks, but were of the sizes commonly made by clock makers, being nine and seventeen inches high, respectively. In March, 1880, however, they entered into a contract with the plaintiffs, Parker & Whipple, to manufacture the Hotchkiss clock at a stipulated sum for each clock made, Parker & Whipple to furnish dies and tools for that purpose. About fifty thousand of these Hotchkiss clocks were made by the defendants for Parker & Whipple, and

delivered to them between June 17, and December 27, 1880.

While the defendants were performing this contract, and having custody of the dies and other tools of the complainant for that purpose, the defendant, Lane, who was superintendent of the Yale Clock Company, made the clock complained of in this case. The imitation embodied in this clock of the Hotchkiss clock was so complete that all the leading parts of the movement in the Hotchkiss can be put into the Lane, and all the leading parts of the movements in the Lane can be put into the Hotchkiss and both clocks will continue to run and operate precisely as before the change was made, and this interchangeability is so extensive as to enter into the subject-matter of every one of the eight claims in controversy. The following, from Mr. Shepard's testimony, should be read in this connection:

"*Int.* 8. Have you an exhibit illustrating the extent to which the 'Defendants' Clock' copies the arrangement and construction of the clocks made in accordance with the Hotchkiss reissue? If so, produce and describe the same.

"*Ans.* I have and herewith produce them. (Producing two clocks.)

The two clocks produced by the witness are placed in evidence and marked Complainants' Exhibits, Exhibits Shepard A and B. J. B. M., N. P.

(Witness continues.)

"The complainants' exhibit 'Shepard A' is, as I understand it, a clock, manufactured under the Hotchkiss reissue with the exception that all of that portion of the train outside of the center wheel and which is in front of the middle plate of the frame has been removed and the corresponding portions

of one of the defendants' clocks has been substituted in place thereof, and with this change the exhibit 'Shepard A' was brought to its present condition. Exhibit 'Shepard B' is the defendants' clock from which the parts were taken to put into exhibit 'Shepard A,' and the parts which were taken from the latter exhibit are now in exhibit 'Shepard B.' These changes were made in my presence and both of the clocks run and operate just the same as before the change was made.

. . . . . .

"*Int.* 11. State whether or not these interchangeable parts, or some of them, enter into each and all of the eight claims whose subject-matter you find embodied in defendants' movement.

"*Ans.* They enter into all of them to a greater or lesser extent.

(Record, page 17.)

The preparations for the manufacture of this copied clock were made in secrecy. (Lane, Rec., p. 114, X-Int. 147 to 154.

Again there was great haste. (Lane, Rec., p. 116, X-Int. 160 to 161.

The following testimony shows how the Parker & Whipple tools were used to make the "Gem" that was to displace the "Jewel."

"77*th X-Int.* Did you punch out the blanks for the wheels in your model, in front of the middle plate, with Parker & Whipple's dies?

"*Ans.* The wheels in the Parker & Whipple clock were the property of the Yale Clock Company, until such time as they were assembled in a finished clock, so with all the parts finished by the Yale Clock Company. I presume I took such parts of the Parker & Whipple clock as I needed to complete my model, such parts being common to all clockmakers.

"78*th X-Int.* I repeat, were the blanks for the wheels, in

front of the middle plate of your model, cut out by Parker & Whipple's dies?

"*Ans.* I presume they were.

"79*th X Int.* You have no doubt about it, have you?

"*Ans.* I don't think I have.

"80*th X-Int.* And in that model the spoking of wheel blanks in front of the middle plate was done by the Parker & Whipple dies, was it not?

"*Ans.* The spoking and blanking is one operation by the same dies.

"81*st X-Int.* And in this case by Parker & Whipple's dies, if I understand you?

"*Ans.* Parker & Whipple's wheel *die*, probably.

"82*d X-Int.* You have spoken of the use of your 'regular wheel-cutting machine' in making those wheels in your model in front of the middle plate, did you use Parker & Whipple's cutter, or cutters, in cutting the teeth of these wheels?

"*Ans.* Probably did.

"83*d X-Int.* And the machine was set in the same way as to cut teeth in the corresponding wheel of the Hotchkiss or Little Jewel clock, was it not?

"*Ans.* It probably was.

. . . . . .

"86*th X Int.* Did you make the holes in your front plate to correspond with the holes in the front plate of the Hotchkiss or Little Jewel? I mean the holes for the pivots.

"*Ans.* I can't say there was any particular reference to the Parker & Whipple front plate. Holes were made to accommodate, in the best manner, the train.

"87*th X-Int.* The holes for the pivots did in fact correspond, hole for hole, with the holes for the pivots in the front plate of the Hotchkiss clock, did they not?

"*Ans.* They did.

"88*th X-Int.* That correspondence did not occur by accident did it?

"*Ans.* It did not.

"89*th X-Int.* The holes for the pivots in the middle plate corresponded with the holes for similar pivots in the Hotchkiss clock, did they not?

"*Ans.* They did.

. . . . . .

"94*th X-Int.* It resulted, did it not, from the way of making your model, that all the wheels in front of the middle plate corresponded, wheel for wheel, in size, shape, number of teeth, and size of teeth, and position, relative to each other and to the center shaft, with the corresponding wheels in the Hotchkiss or Little Jewel clocks?

"*Ans.* Yes.

"95*th X-Int.* And the same correspondence existed between the pinions in front of the middle plate of your model, and the pinions of the Hotchkiss clock, if I am right.

"*Ans.* It did.

"96*th X-Int.* And the distance between the front and middle plate of your Patent Office model was the same as in the Hotchkiss clock?

"*Ans.* I think it was.

"97*th X-Int.* And the pinion shafts were of the same length, were they not?

"*Ans.* I think they were.

"98*th X-Int.* I presume I am right in suggesting that they were some of the very pinion shafts that were cut in the expectation that they would go into the plaintiff's clocks; how about that?

"*Ans.* I presume you are right."

(Lane, Record, page 107–109.)

And the record abounds in evidence proving beyond question, that the defendants sought to gain an advantage over the complainants in fraud of their rights as the owners of the Hotchkiss invention by secrecy, by great haste, and by the use of complainants' property which was in their hands for a fiduciary

purpose, both to produce the Lane clock, and the dies, and machinery for making it.

Mr. Hotchkiss did, indeed, at last so far penetrate the secrecy as to ascertain that the Yale Company were thinking of making a small clock, but he learned nothing as to its intended construction, and of course could not assume that it was to be largely a duplicate of his own clock.

"264 *Re-X.* I understand you to say, that Mr. Hotchkiss asked if you were going to make a small clock, the same size as his, and that you answered in the affirmative — did you on that occasion tell him, or did he know that you intended to copy a portion of his clock so closely that several of his wheels, pinions, and shafts would be interchangeable with the corresponding parts of his clock?

"*Ans.* I did not tell him anything about the construction of the clock."

(Record, page 126.)

We come, now, to the claims of the reissued patent and quote the first eight claims which the court below found to be infringed:

"1. In a clock movement having a frame consisting of three plates suitably connected together, a train which is divided into two parts, a front part and a back part, the front part arranged between the front and middle plates of the frame, and the back part arranged between the middle and back plates of the frame, the point of division being between the center wheel and center pinion, the said center wheel and center pinion being arranged on the center arbor carrying the minute-hand, as set forth.

"2. In a clock movement having a frame consisting of three plates suitably connected together, the middle plate of

the frame, the said middle plate dividing the train into two parts between the center wheel and center pinion; the said center wheel and center pinion being arranged on the center arbor carrying the minute-hand, as set forth.

"3. In a clock movement, a frame consisting of three plates suitably connected together, the middle plate of which divides the train into two parts, between the center wheel and center pinion, the said center wheel and center pinion being arranged on the center arbor carrying the minute-hand, and the frame having the parts of the divided train arranged between its three plates, as set forth.

"4. In a clock movement having a frame consisting of three plates suitably connected together, a center arbor carrying the minute-hand and provided with a center wheel and center pinion, the wheel arranged between the front and middle plates of the frame, and the pinion arranged between the middle and back plates of the frame, as set forth.

"5. The improvement in a clock train consisting of three wheels suitably fastened on arbors carrying pinions, and arranged between the escape wheel and its arbor carrying a pinion, and the center arbor carrying the center wheel and center pinion, as set forth.

"6. The improvement in a clock train consisting of three wheels having the same number of teeth and the same diameters, suitably fastened on arbors, the pivots of which are arranged in the circumferences of circles concentric with the center arbor, the several arbors carrying pinions having the same number of leaves and the same diameters, all the said parts arranged between the escape wheel and its arbor carrying a pinion, and the center arbor carrying the center wheel and center pinion, as set forth.

"7. The improvement in a clock train consisting in the arrangement of the pivots of the escape wheel arbor and of

the pivots of the three arbors carrying the three wheels and the three pinions between the escape wheel arbor and the center arbor carrying the center wheel and center pinion, in a semi-circle, as set forth.

"8. In a clock movement, the combination, with a train divided into two parts, a front part and a back part, by the middle plate of a frame having three plates, the division being made between the center wheel and center pinion, the said center wheel and center pinion being arranged on the center arbor carrying the minute-hand, the escape wheel being arranged in the front part of the train and near the top of the frame, and the pivots of the front part of the train being arranged within a semi-circle, of a pendulum attached to an arbor near the top of the frame and vibrating in a plane passing between the front and middle plates of the frame, as set forth."

Exhibits Shepard Drawings 1, 2, and 3 display to the eye the marked resemblance between all the important elements and arrangements of the two clocks — the Hotchkiss "Jewel" and the Yale "Gem." Mr. Shepard's explanation of these drawings is found in reply to R. D. Int., 131, of his deposition (Rec., p. 54), but need not be referred to here, as the issue of infringement is disposed of adversely to the appellees and there is no cross appeal. We have quoted the first eight claims in order to see whether they are justified by anything in the original patent, and to that question we now solicit the attention of the court.

The following testimony relates to the comparison of the reissue with the original patent, and in a case like this, *which depends much upon technical knowledge*, should have great weight.

Upon this question Mr. George Terry, one of appellants' experts, testifies as follows:

"*Int.* 30. State whether or not the improvements specified in the first eight claims of the reissue are all contained in the clock *described* in the original patent?

"*Ans.* They are all contained in the clock described in the original patent."

(Rec., p. 69.)

And Mr. Shepard to the same effect:

"*R. D. Int.* 138. Please say whether any of the first eight claims of the Hotchkiss reissue in suit specify any invention or improvement not contained in the clock *described* in the original patent to Hotchkiss, and embodied in the patent-office model as represented by the certified duplicate in evidence.

"*Ans.* They do not."

(Rec., p. 56.)

Mr. Earle, who is appellee's expert, contents himself with saying that these eight claims are not both described *and claimed* in the original patent. Mr. Terry and Mr. Shepard are thus undisputed, and the court must clearly find, in spite of technical language employed, that Terry and Shepard are wrong in a matter where they are undisputed, or the question under discussion is disposed of as one of fact, in favor of the appellants.

The following is the testimony of Mr. Earle, to which we refer:

"24*th Int.* Referring, now, to the first eight claims of the complainants' reissued Hotchkiss patent, to which your attention has been called, do you find described *and claimed*

in the original letters patent, any improvement that is described in said eight claims thereof?

"Counsel for complainant objects: first, because the application of the reissue was made less than two years after the date of the original patent; second, because it was made within a reasonable time after the original patent, and before any adverse rights had been acquired in good faith; and, third, because the question is not limited to a mechanical comparison of structures."

"*Ans.* No, I do not."

(Rec., p. 155.)

Again, the patent-office model contained the subject-matter of each and all of the eight claims in question.

"*Int.* 25. Please say whether or not the original model, filed in the patent office in connection with Hotchkiss' original application as represented by the certified duplicate marked Complainant's Exhibit 'Patent-Office Model,' contains all the inventions and improvements described in the Hotchkiss reissue in suit, as specified in the first eight claims.

"*Ans.* It does."

(Terry, Rec., p. 68.)

Again, the drawings are substantially the same, the only change being in order better to show in one figure what is adequately shown in another figure, (Fig. 6) of both the original patent and the reissue.

"*Int.* 26. State whether the drawings of the original patent and of the reissue in suit are substantially the same.

"*Ans.* They are substantially. In fig. 1 the original patent shows one of the dial wheels; that doesn't appear in fig. 1 of the reissue. By leaving out the dial wheel some of

the other parts are more distinctly shown, but the parts that are more distinctly shown in that figure are well enough shown in fig. 6 of the reissue, *and also by fig. 6 of the original patent, so that any clockmaker would understand it.*"

(Terry, Rec., p. 69.)

Besides, the drawings could be corrected by the model (Rev. Stat., Sec. 4916.).

But it is claimed that although all that is claimed in the reissue is in the original model and drawings, yet the descriptive portions of the two patents so differ as to make the latter patent void.

It is true, as stated by Judge Shipman (Rec., p. 177), that the appellants contended that the reissued invention of Hotchkiss was shown in the original model; but they also showed that the drawings of both patents were the same; and they showed that the description of the original patent was incorrect so far as it made a "barrel" or "going barrel" a part of the invention; and that the original patent was guilty of no worse crime than defectiveness or inadequacy in its failure to fully set forth the subject-matter of the controverted eight claims.

As to the "barrel" and "going barrel" of the original statement of invention Mr. Terry testified as follows:

"*Int.* 23. I find in the statement of invention in the original patent to Hotchkiss that a spring '*barrel*' is to be employed and in the clause which begins, 'The nature of said invention consists,' I find that a concentric '*going barrel*' is referred to as an element. Please say whether the Hotchkiss invention has in it any barrel or going barrel of any kind.

"*Ans.* American manufacturers of cheap clocks do not ordinarily inclose the spring of their movement in a barrel,

and there is no barrel in the Hotchkiss clock enclosing the main spring. A concentric going barrel, if that term is used in its technical sense, would denote the element which we find in the Everett Exhibit. There a centrally arranged going barrel is found which has been mistaken for a center wheel of a movement. There is no going barrel in the Hotchkiss movement in any proper sense of that term.

"*Int.* 24. State whether or not, in your opinion, that description, to which your attention has just been called, was calculated to mislead.

"*Ans.* It would mislead all those who use that term in the technical sense in which it is employed in the art."

(Rec., p. 68.)

Referring again to the printed matter of the original patent, it is to be noted, that the statement of invention in the original patent did not *limit* it to any class of clocks. The scrivener did indeed state that it *related* to a specified class. The language of the reissue contradicts nothing in the original statement, excepting the going-barrel blunder. It simply guards against the *inference* that the invention relates to no other class of clocks, *when such an inference would be an error.* An invention relating to a certain class of time-keepers, is clearly the same thing as the same invention when found in other classes of clocks. The original statement was simply inadequate. It did not cover the whole ground. It is too clear for argument, that if an inventor should make an improvement, adapted equally to use in weight-clocks and spring-clocks, and his solicitor should inadvertently make him say in his original specification, "My invention relates to weight clocks," he would have a right to take out a reissue containing a corrected statement.

For what purpose are reissues permitted except to correct, on seasonable application, such errors by

which a man would be deprived of the full benefit of his invention?

Again, as to the inadequate descriptive matter.

The commissioner has found that the failure to make such claims originally, and *the failure to make the corresponding corrections in the preliminary portions of the specification* was due to inadvertence, accident, or mistake. When the Commissioner of Patents accepted back our original specification with one hand, and delivered to us a corrected specification with the other hand, he said to us, upon his oath of office, "I find that the mistake in this case is one that a court of equity would correct, and that it *is co-extensive with the entire difference between the specification surrendered and the corrected one returned.* It was a mistake that entered not only into the final statements of claim but into the preliminary statements also." That the Commissioner so said to us there is a conclusive presumption. When the Commissioner of Patents decides that, by an error such as a court of equity would correct, there was a failure to state the true nature of an improvement in clocks, or looms, or sewing-machines, and a failure to properly claim the actual improvement, and there is not a sentence in the new specification which is not justified by the original specification or drawings, or model, the court has no means of determining that the Commissioner is wrong. To say that the patentee's right of correction of one part of his specification shall be controlled by language in another part of the specification, *which may have been produced by the same mistake* involves an absurdity.

But it should not be overlooked that the original patent contained language, which, *although not found in the precise place where experienced scriveners look*

for it, is just as available to the appellant as if it had been in the very fore-front of the specification.

It is distinctly stated that "one of the leading objects of my invention is to make a cheap, neat, and satisfactory time-piece of unusually small size" (orig. specif., p. 2). And every claim of the reissue now in controversy responds to that subject-matter of invention. These ends were not secured by a single device or by several devices, but by the whole body of devices and combinations which entered into the invention and contributed to those results.

The following parallel columns are significant:

ORIGINAL.	REISSUE.
One of the leading objects of my invention being to make a cheap, neat, and satisfactory time-piece of unusually small size.	The object being to make a clock movement which shall be simple and durable in its construction, of small initial cost in manufacture, and the several parts of which shall be relatively arranged in such manner that the movement may be enclosed in a small and compact case.

Suppose — to employ an illustration suggested by the opinion of the court below — that it had been reserved to an astronomer of this generation, to first formulate the Copernican theory. Suppose that the astronomer invented a patentable orrery, controlled by a spring, exhibiting the movements of the planets about the sun. Suppose the astronomer complied with the requirements of the Patent Office and the law, and filed a model of his invention under section 4891 of the Revised Statutes.

Suppose he filed a drawing of his invention, as

required by section 4889 of the Revised Statutes, which reads:

"When the nature of the case admits of drawings, the applicant shall furnish one copy signed by the inventor or his attorney in fact, and attested by two witnesses, which shall be filed in the Patent Office; and a copy of the drawing, to be furnished by the Patent Office, *shall be attached to the patent as a part of the specification.*"

Suppose he employed a solicitor of presumed capacity to frame a specification, who described the invention for the most part in terms applicable to the Ptolemaic theory, and even made the principal feature of the invention to consist of a "going barrel" that was not to be found in the machine at all. Let it be granted also that the astronomer's right of reissue would be greatly restricted unless he applied for a reissue in season to preserve his full rights under the statute.

But now suppose, on the other hand, that he comes to the commissioner of patents on the very day when the patent is issued and proves that so far as he has failed to protect his invention shown in the model and represented in the drawings it is due to inadvertence, accident, or mistake — nay, suppose that in spite of the stupidity of the scrivener the original specification had said "*one of the leading objects of my invention being to make an orrery that shall exhibit the movements of the planets about the sun.*"

Suppose the Commissioner of Patents should thereupon grant a new patent, by exercising the power of "revision" as well as of "restriction" given to him by the very words of the statute, which new patent should protect the actual invention, — *is the law so that a court would be compelled to declare that patent void?*

We do not understand that this court has ever so laid down the law.

Once again, we are at pains to say that we are discussing the law applicable to seasonable reissues of "manufacture" or "machine" patents, and are not speaking of tardy reissues, or of reissues which attempt to cross the boundaries between the four departments of patentability: the "art," the "composition," the "machine," and the "manufacture"; neither are we speaking of reissues of inventions which are incapable of representation by a corporeal model.

The following language of Mr. Justice Clifford in *Tucker* vs. *Tucker Mfg. Co.*, 10 O. G., 464, seems to us to be a correct statement of the law:

"Errors and imperfections may be corrected, and with that view the commissioner may allow the patentee to *re-describe* his invention, and to include in the description and claims of the patent not only what was well described before, but whatever else was suggested or substantially indicated in the specification, model, or drawings, which properly belonged to the invention as *actually made and perfected.* Interpolations of new features or devices which were neither described, suggested, nor indicated in the original specifications, drawings, or Patent Office model are not allowed, for the plain reason that the commissioner has no jurisdiction to grant a reissue unless it be for the same invention as that embodied in the original patent. . . . . Common knowledge shows that the mechanism of *a loom* and of a *sewing-machine* are essentially different, and it would follow that a patent for one could not be surrendered and reissued for the other, as the Court could see as matter of construction that the commissioner in granting the reissue had exceeded his jurisdiction. Defects in the description

may be cured, but the patentee may not strike out the entire description of one of the ingredients of a combination, and insert in lieu thereof a description of other devices, unless it be alleged that such other devices are the equivalents of the device stricken out (*Gill* vs. *Wells*, 22 Wall., 2)."

Here, we say, is a good statement of the right and of the limitation upon the right. If the patented invention relates to loom mechanism, the reissue must not be for anything relating to sewing-machine, but the courts will not permit the Government of the United States to take an inventor's money, accept the surrender of his original patent, subject his new application to "revision and restriction in the same manner as original applications are" (Sec. 4916), require the inventor to make a new oath to his invention as restated, and prove accident and mistake, and require him to do this at once at his peril, and then deprive him of that which he is, after double scrutiny in the Patent Office, declared to be the original and first inventor of, provided it was "suggested or substantially indicated in the specification, model, or drawings" of the original patent. The patentee who comes for a correction of his patent after long delay stands across the pathway of invention and is a hindrance to progress; the patentee who comes at once and prays that he may have the benefit of the great remedial statute of reissues, is a public benefactor, and should be treated accordingly.

In *Seymour* vs. *Osborne*, 11 Wall., 516, this court said:

"Power is unquestionably conferred upon the commissioner to allow the specification to be amended if the patent is

inoperative or invalid, and in that event to issue the patent in proper form; and he may, doubtless, under that authority, allow the patentee to redescribe his invention and to include in the description and claims of the patent not only what was well described before, but whatever else was suggested or substantially indicated in the specification or drawings which properly belonged to the invention as actually made and perfected."

Again, the court said, in the same case:

"Corrections may be made in the description, specification, or claim, where the patentee has claimed as new more than he had a right to claim, or where the description, specification, or claim is defective or insufficient, but he cannot under such an application make material additions to the invention which were not described, suggested, nor substantially indicated in the original specifications, drawings, or Patent Office model."

In *Bantz* vs. *Frantz*, 105 U. S., 160, it appears from the copy of the original application, printed with the opinion, that the original statement of invention was as follows:

"My invention consists in the arrangement embracing, for *united use* in the manner and for the purposes hereinafter specified, the following features, to wit:

"First, two or more arched fire-chambers, with throats of less area than their capacity; second, an auxiliary combustion reservoir or chamber, with *cima-reversa* shaped bottom and side draft-door; third, a series of reverbatory chambers, with side draft-doors and passages at top for communication with each other; and fourth, a diving or direct flue leading into the chimney or smoke-stack."

The reissued patent contained claims for some of the elements *singly*, while the original patent, both in

the *preliminary statement of invention*, and in the claims, was for the *united or conjoint use* of the several elements.

Upon this state of facts (the reissue being thirteen years after the date of the original patent), this court said:

"If the specification in the original patent was defective or insufficient in claiming a combination of several devices instead of making a distinct claim for every device which entered into the combination, the fact was instantly discernible, even to an unpracticed eye, as soon as the patent was read. Therefore, as said by Mr. Justice Bradley in delivering the opinion of this court in a similar case, *Miller* vs. *Brass Company* (104 U. S., 350), if any correction was desired it should have been applied for immediately; the right to have the correction made was abandoned and lost by unreasonable delay."

(Id., p. 165.)

There is here no overruling of the doctrine of *Seymour* vs. *Osborne*—on the contrary, the implication clearly is that if upon a *seasonable* application and a "proper showing" the reissue had been granted, it would have been a valid patent, as against any claim of departure of invention.

In the *Corn Planter Patent*, 23 Wall., 181, it was contended by counsel for the defendant below that the reissued patents were not for the same *invention* as the original patent (p. 203), and, in reply, the counsel for the complainant below cited the doctrine laid down in *Seymour* vs. *Osborne*. This court, in passing upon the question, said:

"It may be remarked in passing that, in our view, the several reissues are *for things contained within the machines*

and apparatus described in the original patents; but whether they were anticipated by prior inventions, or are void for any other reason applicable to patents and claims generally, is still open. The question of fraud in obtaining these reissues must be regarded as settled by the decision of the Commissioner of Patents."

(Page 217.)

All the appellant asks in this case is the benefit of the doctrine here recognized by this court. Of course, as the law now stands there is a primary requirement that the reissue shall be a seasonable one, but, that requirement being complied with, the law of *Seymour* vs. *Osborne* and of the *Corn Planter* case has never been overruled, as we understand.

In *Herring* vs. *Nelson*, 14 Blatch., 293, Judge Johnson, speaking of the action of this court in the *Corn Planter* case, says:

"But the majority of the court did not apply those views to the decision of *The Corn Planter Case*, but held that the reissues were for things contained within the machines and apparatus described in the original patents, and were, *therefore*, not subject to the objection of diversity of invention."

(Page 304.)

If, now, we turn to *Gage* vs. *Herring*, 107 U. S., 640, which involved the same question, we shall find that this court had an opportunity to disapprove the doctrine adopted by Judge Johnson in supposed adherence to the law as previously laid down by this court, *but that nothing of the kind was done.* On the contrary, this court says:

"To uphold such a claim, *made so late*, would be to disregard the principles governing reissued patents stated upon

great consideration by this court at the last term, in the case of *Miller* vs. *Brass Company*, 104 U. S., 350, and since affirmed in many other cases: *James* vs. *Campbell*, Id., 356; *Heald* vs. *Rice*, Id., 737; *Mathews* vs. *Machine Company*, 105 U. S., 54; *Bantz* vs. *Frantz*, 105 U. S., 160; *Johnson* vs. *Railroad Company*, Id., 539; *Moffitt* vs. *Rogers*, 106 U. S., 423."

(Page 645.)

The clear implication from this opinion seems to us to be that Judge Johnson's statement of the law was right as applied to seasonable reissues, but that it was erroneously applied to a case where the right to reissue for the purpose of expanding the claim had been lost by laches and delay.

Among the statements of law cited by Judge Johnson was the following from *Stevens* vs. *Pritchard*, 10 O. G., 505, decided by Mr. Justice Clifford:

"Surrenders are allowed in order that what was imperfect before may be made perfect, and in order that what was before ambiguous may be made clear and certain; and, for that purpose, the patentee may *add* whatever was substantially suggested or indicated in the original specifications, drawings, or Patent Office model."

(Page 506.)

In *Christman* vs. *Rumsey*, 17 Blatch., 155, Judge Blatchford said:

"The view taken by this Court in *Herring* vs. *Nelson* (before cited), of the decisions in *Gill* vs. *Wells* and *Russell* vs. *Dodge*, seems to me to be a sound one. Under the decision in The Corn Planter Patent (23 Wallace, 181), which was subsequent to that in *Gill* vs. *Wells*, the reissue in the present case cannot be held to be void. The drawings of the original and the reissue being the same, and the two specifications describing the same mechanical structure,

with the same mode of operation, it must be held to be lawful to reissue the patent with claims to combinations of fewer elements than were contained in the combination claimed in the claim of the original patent. The original claimed a general and larger combination, and the reissue claims sub-combinations which enter into such general and larger combination. Such a reissue was sustained in *The Corn Planter Patent*, on the ground that *the reissue was for things contained within the apparatus described in the original patent*, and against the effort to control the case by the decision in *Gill* vs. *Wells*."

Opinions may differ as to what would have been the result in this case if the doctrine of *Miller* v. *Brass Co.* had been applied to it, but there can be no doubt whatever of the soundness of the court's position as applied to seasonable reissues.

Again, the law was laid down by Judge Blatchford in *Potter* v. *Stewart*, 18 Blatch., 562:

"Mr. E. S. Renwick, an expert witness for the plaintiffs, testifies that every improvement that is specified in the reissue is found described in the specification and drawings of the original patent. There is no testimony in contradiction of this. This being so, it follows, necessarily, that every combination described in the reissue as performing a given office existed in the machine described and shown in the specification and drawings of the original patent, and performed in a machine constructed in accordance with the specification and drawings of the original patent, the same office it performs in a machine constructed in accordance with the specification and drawings of the reissue. Therefore, every such combination might have been patented in the original patent, by a proper claim. If so, not only was a reissue proper, but a reissue in the form granted. It is of no consequence that the reissue states that certain combinations are found in the machine, which will act in a certain

way and effect certain results, when the original did not state that such combinations were found there or failed to state that said modes of operation and said results would follow, provided the said combinations in fact existed in a machine made according to the drawings and description in the original patent, or provided the said modes of operation and the said results in fact followed in a machine so made. To supply such defects is the very object and office of a reissue."

This case was decided January 22, 1881, *the very day on which Mr. Hotchkiss surrendered his original patent and asked for a reissue.*

In *Am. Diamond Rock Boring Co.* vs. *Sheldon*, 17 Blatch., 213, Judge Wheeler quotes with approval the following passage from Mr. Justice Clifford's opinion in *Thomas* vs. *Shoe Mfg. Co.*, 16 O. G., 541:

"Inquiries in such a case are restricted to a comparison of the terms and import of the two patents, in view of the drawings and Patent Office model. If from these it results that the invention claimed in the reissue is not substantially different from the one described, suggested, or indicated in the specification or drawings of the original patent, or Patent Office model, the reissued patent must be held valid, as all other alterations and amendments plainly fall within the intent and purpose of the provision in the act of Congress, which allows a surrender and reissue; or, in other words, if the reissued patent does not, upon the face of the instrument, embrace anything not substantially described, suggested, or indicated in the specifications, drawings, or model of the original, the defense that the reissued patent is not for the same invention as the original must be overruled."

The case of *Manufacturing Co.* vs. *Ladd*, 102 U. S.,

408, has been greatly misunderstood, and even misapplied.

In that case there was an effort to cover what was not to be found even in the original model. Hence the language of the Court. But nothing is to be found in the case hostile to the claim which the complainant makes in this case, as the following language shows:

"A comparison of the original letters-patent, *including the drawings and model*, with the reissued patent, makes it very evident that the latter is the result of an effort to enlarge the scope of the patent so as to include and embrace within it matters and things that were not embraced in the original invention."

(102 U. S., 409.)

In *Miller* vs. *Brass Co.*, 104 U. S., 350, the following passage occurs:

"We think, however, that the Court below was clearly right in holding that the invention specified in the second claim of the reissued patent (which is the one in question here) is not the same invention which was described and claimed in the original patent. The latter was for a double dome *without a chimney*, the peculiarity of the supposed invention being the use of the double dome as a means of dispensing with the chimney. The reissue is for a single dome *with a chimney*. It is not only obviously a different thing, but it is the very thing which the patentee professed to avoid and dispense with."

(Page 351.)

It is too plain to admit of doubt that, so far as this case in the Supreme Court turned upon the precise issue that was passed upon in the court below, it was

sustained upon the ground that something had been reissued into the specification *which was not in the original specification, or drawing, or model.* Justice Bradley's opinion will be searched in vain for any suggestion or implication that the reissue would have been held void if it had been applied for at once and had not departed from the original drawings, or model. The original model had no chimney — of course a chimney could not be imported into the patent by reissue.

In both the *Swain Turbine* case and in the *Corn Planter* case the law was applied as we claim it — in the first case, by refusing to give weight to the inventor's claim that he had a right to include in his reissue *what was not in his original model,* and, in the latter case, by sustaining all the reissued claims that could be justified *by apparatus.*

In *Mathews* vs. *Machine Co.,* 105 U. S., 54, 58, the court says:

"It cannot be denied that each of these separate claims is much broader than the claim in the original patent; and they are put forth in the reissue fourteen years after the original was granted. The latter showed on its face that these broad claims were not made; and if the patentees were really the inventors of an independent jacket standing loosely on the elbow of the main, when apprised that it was not claimed in the patent they ought to have used due diligence in surrendering it and having the mistake corrected. The case clearly comes within the ruling in *Miller* vs. *Brass Company,* 104 U. S., 350."

In one respect only did the court find a departure of invention and that was with reference to a "certain

jacket or casing" which was so reissued as not only to transcend the invention disclosed in the drawings of the patent, but to include such a jacket as was described in an earlier patent to the same inventor.

Here is nothing certainly that overrules the doctrine of *Seymour* vs. *Osborne* and the *Corn Planter Case*, when applied to a seasonable reissue.

In *Moffitt* vs. *Rogers*, 106 U. S., 423, there was a *complete* change of invention so as to *cover* and claim what *could not* have been claimed by the original patent. This court said:

"The specification and first claim of the reissued patent are a plain attempt to include a device which was not and *could not* be fairly covered by the original patent. That claim is, therefore, for that reason void."

(Page 428.)

In *Clements* vs. *Odorless Apparatus Co.*, 109 U. S., 641, Mr. Justice Blatchford said, speaking for this court:

"The foregoing state of facts brings this case within the principles laid down in *Miller* vs. *Brass Co.*, 104 U. S., 350, and *James* vs. *Campbell*, 104 U. S., 356. The suggested mistake in the original patent, that its two claims were not as broad as they might have been made, and that the combinations claimed were too narrow and contained too many elements, and that sub-combinations such as are found in claims 1 and 3 of the reissue might have been claimed in the original patent, in view of the state of the art and of the description and drawings of that patent, was, if a mistake at all, one apparent on the first inspection of that patent. The expansions in claims 1 and 3 of the reissue were afterthoughts, developed by the subsequent course of improvement

in the Scharf and Frazier patents, and intended to cover matters appearing in those patents and not claimed in the original patent, No. 115,565. No excuse is given for the delay in applying for the reissue, nor is any actual inadvertence, accident, or mistake shown. The omission to claim sub-combinations in the combinations claimed, the existence of such sub-combinations being apparent on the face of the original patent, was, in law, on the facts in this case, such a dedication of them, if new, to the public, that a reissue, to cover such combinations, in revocation of such dedication, cannot be availed of to the prejudice of rights acquired by the public to what is shown in the Scharf and Frazier patents, issued before the reissue was applied for. The reissued patent must, for these reasons, be held to be invalid, as to claims 1 and 3." (Page 649.)

Here the implication seems to us to be clear and distinct that *if the reissue had been seasonable* the only limitation upon the right to claim in the reissue would have been the outer boundary of actual patentable newness in the apparatus actually disclosed in the original patent.

The case of *McMurray* vs. *Mallory*, 111 U. S., 97, simply lays down the law as applied to a tardy reissue. This court says:

"The contention of the appellants, that a devise so unlike the soldering-tool described in the original Barker patent as the Tillery & Ewalt tool is embraced by the first three claims of the reissue, is striking proof of the expansion of the original claim." (Page 103.)

So the case of *Turner* vs. *Dover Co.*, 111 U. S., 319, went off upon the comparison of *claims* between the original and reissue, the reissue having been applied for too late to obtain the full benefit of the

right of revision and correction which the statute gives.

See also:

Mahn vs. *Harwood*, 112 U. S., 354.
Torrent Arms Co. vs. *Rodgers*, 112 U. S., 659.
Woollensak vs. *Reiher*, 115 U. S., 96.
Eachus vs. *Broomall*, 115 U. S., 429.

It was urged in the court below that there are alterations in the names by which the various parts of the patented clock are designated. In reply we ask how the fact could be otherwise when the original specification was prepared by a man who knew nothing about clocks and the reissued specification was written by a thorough expert in the clock-making art?

The case of *Kerosene Co.* vs. *Littell*, 13 O. G., 1009, in the New Jersey district, is a case in which very considerable changes were made in the descriptive part of the specification, involving the use of new names for operative parts of the invention. In this case Judge Nixon cites with approval *Aultman* vs. *Holley*, *Herring* vs. *Nelson*, and *Seymour* vs. *Osborne*. Referring to the great change in the description, he says:

"A 'kerosene lamp' is not mentioned by name, nor is a 'slotted deflector or cone'; but the flame of a kerosene or other lamp, 'passing through a slotted deflector or cone,' is so clearly *exhibited* that a mechanic of ordinary skill, having the drawing, would make no mistake and have no difficulty in constructing the device or apparatus more fully set forth in the specifications of the reissue." (Page 1010.)

But it may be claimed again that the drawings have been materially altered. Only one figure was altered, and that simply to make it conform to the other figures and the model. The statute expressly authorizes such an alteration. No witness says that the alteration is material.

It was once suggested, too, that the drawings do not show the three wheels of the fifth claim. If this were true, and were material, the fifth claim only would be affected. But only one of the drawings of the original patent was defective. When corrected by the other drawings and by the model it, equally with them, displayed the "three wheel" invention. In reply to Int. 29, Terry states that in Fig. 1 of the original patent, in connection with Fig. 6, "*one skilled in the art would find all the elements shown in the reissue.*" *Mr. Terry is not disputed in this matter. Upon such a question expert testimony is both competent and conclusive.*

It was once claimed, too, that the original patent was not inoperative or invalid for any cause. The commissioner's decision upon that subject is conclusive, as we suppose, but we have supplemented it by proof that not only was one of the drawings defective *but a material portion of the specification was absolutely misleading.*

It is said again that the original invention related to going-barrel clocks only. We have shown that it did not relate to going-barrel clocks, and that the statement to that effect was a clear mistake. We have shown, too, that the right of reissue is broad

enough to authorize a correction of this misstatement of our invention and a substitution for it of a true statement of its actual scope.

It was once claimed, also, that the definition of *new matter* contained in *Powder Co.* vs. *Powder Works* is such as to preclude a reissue for any portion of the invention actually made and perfected and embodied in the patented clock, excepting that specified in the original claims. If this be true it is difficult to see what necessity there was for the doctrine of *Miller* vs. *Brass Co.* If the claim be true, a belated application is just as serviceable as a seasonable one.

The facts in *The Powder Co.* case are well-known. The description of the composition sought to be covered by the reissue was struck out of the application, so that it found no place in the specification. When, therefore, the reissue came to be tested by comparison, there was no warrant for the new claim in the original specification, nor was there any drawing or model. The language of the court must be construed with reference to the facts before it. The thing sought to be patented in *Powder Co.* vs. *Powder Works* was a new process; it was sought to reissue it beyond the limits of the process into a new composition *not the result of practicing the process.* Our original patent was for Hotchkiss' invention in clocks; our reissue does not travel outside the limits of that invention in clocks. The true meaning of this case was apprehended in the Post Office Box Case, 18 Blatch., 248, where it was held not to stand in the way of the correction of a palpable mistake resulting in a misstatement of principles, so that an inventor is about to lose the fruit of his labor.

It is now argued, relying upon *Powder Co.* vs. *Powder Works*, that the actual invention, when determined, can not be redescribed in the reissue so as to cover a different invention from that which the original specification disclosed.

With a proper construction of the phrase "different invention" that position is a sound one. It is sound when applied to the case of a process reissued for a product *not* the result of the process. It is sound when applied to the case of a machine calculated to be employed in producing a result, reissued to cover the process of producing that result and irrespective of the particular machine employed. [*Campbell* vs. *James*, *Heald* vs. *Rice*.] It is not sound when applied to the case of a process reissued for a product which is the result of the process. [*Goodyear* vs. *Day*.] And, we submit, that it is not sound when applied to the case of a machine imperfectly described in the original, and reissued within a reasonable time with a corrected description of the same machine.

In a machine patent the "same invention" includes all that is novel *in the mechanism* of the machine submitted to the government for a patent. The term is used in the statute in a comprehensive and complex sense. It is spoken of as a thing capable of subdivision into "distinct and separate parts," each of which may be the subject of a separate reissued patent. It does not follow because an inventor may not reissue a machine into a disembodied process that he may not cover by reissue all that is new in his machine as a mechanical structure, and the original

description need not reveal all this *mechanical* newness. The last clause says:

"But when there is neither model nor drawing, amendments may be made upon proof satisfactory to the commissioner that such new matter or amendment was a part of the original invention, and was *omitted from the specification* by inadvertence, accident, or mistake, as aforesaid."

Can it be contended that *omissions* from the specification may be supplied by secondary proof and not by the best proof recognized by the statute? The pretension that omissions from the specification may not be supplied from the drawings or model upon proof to the Commissioner that the omissions occurred through mistake is contrary to the express language of the law. It should never be forgotten that it is the "*thing* patented" and not the *description* of the thing patented that is the subject of reissue. [See Rev. Stat., Sec. 4916.]

A court of equity will correct mistakes of omission as well as mistakes of inadequate expression. The expression "defects of the specification" used by Judge Bradley in *Powder Co.* vs. *Powder Works*, 98 U. S., 138, clearly covers defects growing out of omissions in the specification, as the context shows. In the case under consideration, Mr. Hotchkiss returned in season to the Patent Office, and said "I *omitted* this" and "my solicitor did not understand that." His application was "entertained," a "proper showing" was made, a "correction" was made, coextensive with the omission and with the solicitor's misunderstanding, and by the authority of *Miller* vs. *Brass Co.*, his reissue is good.

Again, as to all that argument, based upon the original specification from which it is concluded that the *intention* of the patentee did not contemplate these claims, the seasonableness of the application for a reissue is an effectual answer.

When it is conceded that the commissioner has jurisdiction to determine the existence and extent of the mistakes in the original; when it appears by his action in the premises that there were mistakes, and what he found them to be, and that the patentee returned to the office *within reasonable time;* there is no room left for any denial of the existence of the mistakes based upon the differences between the papers themselves so long as the reissue contains a true description of the original article, and claims nothing which it does not contain.

The action of the patentee in returning promptly to secure his proper rights is a bar to that sort of criticism. It may not be said to a man — "Your original description of your invention proves that you did not think you had invented so and so" — *if by his promptness in suppressing that erroneous original and substituting a corrected specification, he has entitled himself to reply* — "*My original was incorrect; I was diligent in correcting it; you have no right to argue from the original as to the workings of my intelligence, because it was wrong, and because it was not left uncorrected long enough to work a forfeiture of my right to correct it.*"

And it will be plain that a like answer could properly be made if it were contended that the specifica-

tion alone, without recourse to the model and drawings, were the proper source of information as to the extent of the invention which was "*attempted* to be secured by the original patent."

On this point it may be noted in passing, that Mr. Justice Bradley in the *Powder Co.* case very clearly indicates that the "attempt" to secure an invention may be evidenced by testimony *de hors* the specification. Speaking there of the last clause of Sec. 53 of the act of 1870, which reads as follows:

"But where there is neither model nor drawing, amendments may be made upon proofs satisfactory to the commissioner that such new matter or amendment was a part of the *original invention*, and was *omitted* from the specification by inadvertence, accident, or mistake,"

He says:

"But this clause relates only to the *evidence which may be employed by the commissioner in ascertaining the defects of the specification.*" (98 U. S., 138.)

Thereby giving countenance to the doctrine for which we contend: to wit, that the commissioner, in ascertaining what was the nature and extent of the invention attempted to be secured by the original patent, may resort to evidence extraneous to the original description, to wit, the drawings and even the model.

Now it appears from these considerations that if the Commissioner of Patents has power to say upon the facts as they are proved in an application for a reissue that the original specification is incorrect and defective, the position taken by defendants must fail.

The fallacy of our opponents' argument is in that they seek to limit the enquiry as to the scope of the invention to a consideration of information which is derived from an *incorrect* and *defective* specification.

To what purpose is it to harp upon the misstatements and errors of the original, as showing the actual invention, if it be true that the original was surrendered before the right of correcting it had expired?

How can the defendants take advantage of the omissions of the original to argue that the patentee did not "attempt" to cover certain combinations found in the model and drawings, if it be true that the patentee has by his satisfactory diligence in repudiating that original and returning to claim those omitted combinations, demonstrated that he *did* attempt to cover them; and if the commissioner, acting within his undisputed authority and upon evidence to which the statute authorizes him to resort, has ascertained the defects of the specification, declared them to have resulted from accident, inadvertence, or mistake, and issued a new patent for the same machine, or so much thereof as was of the patentee's invention?

We submit that a defective original specification (whether its defects be of omission or of misdescription), *if it be corrected before the right of revision has expired*, is not conclusive upon a patentee as to the scope and nature of his invention attempted to be secured thereby.

And we await with confidence the decision of this court upon the proposition that a model and drawings

being filed and the "thing patented" being partially and defectively described in the original, additional combinations found in the model and adapted to further secure the declared purpose of the inventor, are parts of the same invention within the comprehensive meaning given to that phrase by the statute relating to reissues.

It is distinctly stated in the original patent that "one of the leading objects of my invention is to make a cheap, neat, and satisfactory time-piece of unusually small size." And every claim of the reissue now in controversy responds to that subject-matter of invention. These ends were not secured by a single device or by several devices, but by the whole body of devices and combinations which entered into the invention and contributed to those results, and were claimed within a reasonable time there being inadvertence, accident, or mistake.

Again, we direct attention to the language of the original specification, reading as follows:

> "One of the leading objects of my invention being to make a cheap, neat, and satisfactory time-piece of unusually small size."

No one will claim that the subject-matter of the first claim of the reissue did not partially secure this "*leading object of my invention.*" No one will claim that the subject-matter of each of the subsequent claims of the reissue did not partially secure this "*leading object of my invention.*" Can that be a departure from the invention which was intended to secure, and which was adapted to secure, a leading

object of the invention as stated in the original specification? And may not the patentee redescribe his machine, using the *drawing* and model for that purpose, so as to better set forth and claim the *mechanisms* that conduce to this leading object in his structure? There would seem to be but one answer to this question; and yet we have done nothing more.

It is believed that but a single authority can be found standing in opposition to the general current of opinion and sustaining the proposition that a machine patent may not be reissued for that which is disclosed in the drawings of the original.

That case (*Kells* vs. *McKenzie*, 9 Fed. Rep., 284) was decided in November, 1881, and rests upon a mistaken interpretation of *Manuf'g Co.* vs. *Ladd.* That case related to a belated reissue, and many considerations, therefore, which are wanting to the present case, conspired unfavorably to the patent. No doubt if the patentee in that case even had stated the object of his invention, and the new claims had related to additional combinations shown in the drawings and adapted to the better accomplishment of that object, the reasoning of the learned court would have resulted in a different conclusion.

But in a subsequent case in the same district, the same judge has used the following language in the case of *Searls* vs. *Worden*, 21 O. G., 1955.

"The validity of the reissue depends upon the fact whether the patents are for the same invention, and the identity of the invention must be determined *by the drawings* and specifications construed together."

It was urged upon argument below that the matter claimed in the reissue "might be the subject of another patent," and was *therefore* new matter within the meaning of the patent act. That is a *non sequitur*. A single invention may be the subject of one patent, or the parts of it may each be the subject of a separate patent; or by Sec. 53 of the statute an original patent may be reissued into several patents, each one of which is for the same invention as the "*thing* patented."

It does not follow that because an invention is divisible into parts, each one of which may be the subject of a different patent, *that such parts are not of the same invention.*

Suppose in the present case that the patent in suit had been granted subsequent to Hotchkiss' original patent and to a stranger.

Would not the production of the Hotchkiss' original patent *with drawings showing the invention* and a certified copy of the Hotchkiss model, accompanied by the uncontradicted testimony of two competent experts that the specification and drawings thereof would enable one skilled in the art to construct the clock shown in that model, anticipate the patent in suit, irrespective of whether such clocks had been in public use prior to the application for the patent in suit?

Now suppose Hotchkiss, instead of reissuing the original, had applied for a new patent for the eight claims in controversy, would the new patent have stood any better?

Let us see what this court has said:

"It is hardly necessary to remark that the patentee could not include in a subsequent patent any invention embraced or described in a prior one granted to himself any more than he could an invention embraced or described in a prior patent granted to third person. Indeed, not so well; because he *might* get a patent for an invention before patented to a third person in this country, if he could show that he was the first and original inventor, and if he should have an interference declared."

James vs. *Campbell*, 104 U. S., p. 382.

CONCLUSION.

It is conceded and held by the learned court below that our right to reissue had not been lost by laches or delay. We have, therefore, devoted this brief to an attempt to present the law as applicable to a reissue applied for in season.

It seems to us that the signs of the times point to a period of greater certainty in the administration of the law of reissues. The doctrine of laches as applied in *Miller* vs. *Brass Co.*, and many later cases, will give to the public and to subsequent inventors all the protection against expanded reissues that they can possibly claim or need. When, therefore, the reissue is unreasonably delayed one rule only will apply, namely, to declare it void, if it expands the *claims* of the original patent. *But where no intervening rights have been acquired in good faith, where the relation between the public and the patentee remains unchanged* there is no reason why, there being accident or mistake, the latter

should not correct his patent so as to make it just as effective to protect his invention as his original patent would have been had it described that invention in its perfection, and claimed every combination and sub-combination and element of which he was *the original and first inventor.*

Here, too, one rule of decision should prevail (in case of a machine patent) — the rule which we understand to have always been the law — to sustain the reissue if it contains nothing which was not described, or suggested, or shown in the original description, drawing, or model.

The first rule will protect the public; the second rule will protect inventors, *and both rules will promote justice.*

C. E. Mitchell

John K Beach

23-87

Supreme Court of the United States,

OCTOBER TERM, 1887.

No. 18.

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vs.

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Complainants and Appellants,

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DEFENDANTS' BRIEF.

The reissued patent upon which the bill of this case is brought (*Hotchkiss, No.* 10,162, *March* 14, 1882), is for an improvement in clock movements, and comprises ten claims.

The 9th and 10th claims may be laid out of view, as infringement is not claimed in respect to either of them.

The first eight claims, in respect to which infringement is claimed, may be grouped into two classes—the one class relating to what the patentee characterizes as *a division of*

the clock train—the other class to what he characterizes as *a three-wheel* movement in the clock train.

The 1st, 2d, 3d and 4th claims are of the first class. The novelty claimed in each of them is the *division of a clock train* by which (according to the complainant's construction of the patent, which we will for the present purpose, assume), the several parts of the clock movement are so arranged or disposed between the three plates of the frame of a clock movement, that the middle plate shall divide the movement into two apartments on either side of it, the point of division being between the centre wheel and centre pinion.

The 5th, 6th, 7th and 8th claims are of the second class. The novelty claimed in each of them is in the provision of *three wheels* (instead of one wheel or two wheels or any other number of wheels than three), to carry the power from the centre wheel to the escape or crown wheel.

These eight claims of the patent may, therefore, for convenience of argument, be reduced to two—one for *dividing the train* at a certain point; the other for providing the train with *three wheels* for a certain purpose.

Such being the inventions claimed in the first eight claims of the reissued patent we say:

FIRST POINT.

The original patent was not for either of these inventions but for claimed inventions which were entirely different from either of them; the specification of the reissued patent is almost entirely of new matter; and the reissued patent is, therefore, void.

In comparing the reissued patent with the original, Judge Shipman, in the court below (fol. 303), thus expressed his opinion:

"It might as well be said that the Copernian system was a mere restatement of the principles which had been misstated in the Ptolemaic system, as that this reissue was a restatement and enlargement of the principles of the invention which was the subject of the original patent."

The claims of the reissued patent are not only entirely new claims, of which there is not a trace in the claims of the original patent, but the description of the invention, of which these claims are the particular specification is also entirely new, and is the description of an invention entirely different from that for which the original patent was granted.

In fact, there is not in any part of the original Letters Patent, whether text or drawing, anything whatever to

show, suggest or hint that the patentee regarded the subject of these eight claims as being of his invention or as having anything in it of patentable novelty or even as forming any distinct feature of the mechanism which he supposed he had invented.

A simple comparison of the patentee's description of the invention for which the reissued patent was taken, with his description of the invention for which the original patent was issued, makes this clear.

We place them side by side.

ORIGINAL—(Nov. 4, 1879).

"This invention relates to that class of time-keepers in which a fixed annular rack or internally-toothed wheel is employed to aid a spring-barrel in rotating the train of wheels.

The nature of said invention consists, partly, in the combination of a fixed internally-toothed circular rack and a concentric going barrel or plate with a mainspring, a transmitting-wheel rotating with said barrel and a fixed clock movement.

REISSUE—(Mar. 14, 1882).

"My invention relates to an improvement in clock movements, the object being to make a clock movement which shall be simple and durable in its construction, of small initial cost in manufacture, and the several parts of which shall be relatively arranged in such manner that the movement may be inclosed in a small and compact case.

To this end, the invention consists essentially in dividing the train into two parts:

It also consists in arranging the operating parts of the time-piece on a fixed plate and attaching the same to the back of the clock-case by means of tongues which extend out from said plate through perforations in the back of said case.

It also consists in providing said tongues with broad shoulders, which cause said plate to stand out from the back of the clock-case, so as to leave space for the mainspring between them.

It also consists in the combination of a mainspring having a perforated end with a lateral finger extending from the broad part of one of said tongues, whereby said mainspring is firmly held at its fixed end, yet easily detached.

It also consists in the combination, with a fixed plate, which confines the mainspring and supports the movement of a rotating plate arranged in front of said fixed plate, and

In arranging the divisions of the train in a frame having three plates:

In providing an additional wheel and pinion between the escape wheel and center wheel:

In making the three wheels between the escape wheel and center wheel with the same number of teeth and of the same size:

In arranging the pivots of the three arbors carrying the three like wheels and pinions between the escape wheel and center wheel in the circumferences of circles which are concentric with the center arbor.

And in other minor improvements as the invention is hereinafter more fully described and explained by reference to the drawings."

provided with a hub which extends through said fixed plate and is connected to the winding end of the mainspring.

It also consists in adapting to and combining with the hub thus constructed a key having a screw-threaded winding part for engaging with said hub and a recessed part for engaging with the prismatic end of the center-shaft.

It also consists in constructing the annular rack or internally-toothed wheel with an annular recess for receiving the pillar-plate and thereby economizing space.

It also consists in constructing the pillar-plate and pillars in one piece, and attaching said pillars to the front plate by twisting them.

It also consists in substituting an automatic winding-dog, operating like an escapement-verge, for the click and spring ordinary used.

It also consists in construct-

ing the case with an opening at the bottom and adapting the key and the adjusting nut of the pendulum-ball to one another, so that the adjustment of the said ball may be effected conveniently from the outside of the case.

It also consists in providing said ball with a spring which will force it down into place, and with a guide which will prevent it from turning."

And the claims of the two patents conform respectively to this difference of description.

Of the twelve original claims ten disappear in the reissue.

Of the ten claims of the reissue but two, the 9th and 10th, have any relation to the invention described in the original patent.

The two descriptions of the inventions above quoted have not a single expression of language or a single suggestion of idea in common.

In the original, there is not the faintest reference to a frame of "three plates," or a "division of a train" between

three plates—or a provision of "three wheels" in the clock movement.

On the other hand, the reissue does not contain any reference to the various parts so minutely and elaborately set forth in the original description, as the principal parts of the invention, unless they are comprised in the "other minor improvements," which were not considered of importance enough to describe verbally.

A more complete metamorphosis of an invention cannot easily be conceived.

And the reason for it is obvious.

The object of this reissue was to cover the defendant's clock. This is manifest, and will not be disputed.

But this necessitated an entire "change of base." The original patent starts with the declaration that the invention "relates to that class of time-keepers in which a fixed annular rack or internally toothed wheel is employed to aid a spring-barrel in rotating the train of wheels," and the patentee's claimed arrangement of parts, has no special adaptation to any other class of time-keepers than the peculiar class thus pointed out.

But the defendant's clock is not of that class of time-keepers. Its parts are those of an ordinary clock movement, and, therefore, to cover it, the invention claimed by the reissued patent was required to "relate to an improve-

ment in clock movements" generally, and of whatever class.

Starting upon this different line, the specification of the reissued patent proceeds with a detailed description of the invention, which is throughout, and in all its detail, as unlike that given in the original patent, as is the general description to which we have already called attention by the exhibit in parallel columns.

Nor is this all. The drawings of the original patent entirely fail to show or even suggest the invention claimed by the reissue. And they had to be materially altered in order to conform to the new matter of the reissued specification.

In neither the original or the reissued patent do the drawings show, in any special relation to each other or to the other parts of the movement,a frame of the three plates, which are designated in the reissued patent, as the "front," "middle" and 'rear" plates.

Nor are any such plates pointed out or suggested, in any such relation, in the verbal description of the drawings contained in the original patent. In that description, reference is made "to the dial plate," "the plate to which it, (the mainspring) is attached," "the fixed plate," "the rotating plate," "the pillar plate," the front pillar plate," and "the rear pillar plate," but no allusion is made to any *front*, or *middle* or *rear* plate of the frame. Nor are such

plates, by any other description, alluded to as having any special relation to each other or to the movement.

And in consequence of this failure of the drawings to show the "three plates," the verbal description of the drawings in the reissued patent fails to indicate them in any such relation to each other as is claimed by the specification.

And so as to the "three wheel" invention of the reissued patent. It was not only not shown in the drawings of the original patent, but what was shown, affords conclusive proof that the patentee did not regard it as the subject of a claim. It certainly negatives any idea of "mistake" in not claiming it.

For these drawings show but *one* wheel in that part of the movement where, according to the reissued patent, there should be *three* wheels. And the drawing had to be made over, for the reissued patent, in order to exhibit the invention which now forms the subject of its 5th, 6th, 7th and 8th claims. See *G. Terry*, fol. 109.

That the original drawing was made as it was by "inadvertence and oversight," and that the mistake was not discovered until after the patent had been not only issued but reissued, is "too bald for human credence."

There can be no question of "due diligence" here. For the vice is not that of an expanded claim.

When this patentee took his original patent out of the envelope he found a valid and operative patent, its descrip-

tion of the invention he desired to secure being "full, clear and exact," and its claims covering completely the ground taken in by the description.

If, at that time, it had occured to him that he had invented something else than he had there described, and in fact the something which he has since described in the reissue of March 14, 1882, or even if it had then occurred to him that he had omitted to make application for such an invention, although entitled to it, he could not, no matter how diligent, have returned the document to the Patent Office that it might be reissued so as to cover the additional invention. His only course was to apply for another patent for the other invention.

But it is very clear that no thought of such an invention did then occur to him, nor did such an idea break upon him until after this defendant, relying upon his action, had acquired the Lane (defendant) patent and entered upon the manufacture of clocks in accordance with it, and which it is conceded have nothing in them in any way infringing the original Hotchkiss patent.

Nor was it until after this original patent had been once reissued, and after the ingenuity of a new solicitor had been brought into action, with the defendant's successful clock before him as a guide, that the inventions which form eight-tenths of the claims of the present patent were discovered to have been the property of the patentee.

To suppose that such an omission could have occurred

"by inadvertence and mistake" is to stultify the patentee and his solicitor and ourselves.

SECOND POINT.

But there is nothing of patentable novelty in the inventions claimed by the first eight claims of the reissued patent as they are construed by the complainant, and upon the assumption of said construction the failure of the patentee to include them in the original description of his invention is, by this reason, easily accounted for.

I. A "*division of the train*," in the sense given to that phrase by the complainant's construction of this patent—that is, the arrangement or disposition of the several parts of a clock train into the two compartments formed by the three well known plates of a movement frame, so that they will lie more compactly and occupy less space than when otherwise arranged—involves no exercise of the inventive faculty, or any result that is patentable.

(1.) It is conceded that such an arrangement or division of the parts of the train has no effect upon the functions of the clock as a time-keeper, and no useful purpose

is claimed for it other than compactness of arrangement, by which the size of the clock may be reduced.

J. Shepard, Comp. ev., folios 79, 68, pp. 48, 40.

It is, therefore, in no sense an improvement in clock-movements. The improvement is simply in arranging the parts of a clock movement within its frame, so as to make a small clock.

But there is no more "invention" in such planning than in the work of an architect who plans a house by which room is economized by convenient arrangements—or of a mill-owner who, by arrangement of his shaftings and beltings, makes an efficient mill out of a small building—or of a trunk maker who aids the packing of a trunk by an arrangement of compartments.

The commercial fashion of to-day may call for a small clock and to-morrow for a large one. The change of arrangement which is required to meet this demand cannot make a new article.

(2.) But if such re-arrangement of the parts of a clock movement can be dignified as "invention," it can, clearly only be so when the parts of the movement to be so arranged are given and known.

It can only be in respect to certain *parts* of *given* construction, shape and size, that there can be any "division"

which will result in a *whole* of required construction, shape and size.

It is absurd to say that by dividing, that is, arranging, the parts of *any* clock train, on either side of the middle plate of a three-plate frame—the point of division being between the center-wneel and center-pinion—a small clock will result.

It seems hardly less absurd to say, as complainant's expert appears to say (*J. Shepard*, fol. 63), that if a certain result of this sort will follow the division or arrangement of certain known parts of a clock movement, that the same or similar result will follow by such a division in case of the substitution for any of tnese parts of their mechanical equivalent.

If the supposed substitution be of an "equivalent" for the purpose of packing or arrangement, *i. e.*, an equivalent in construction, shape and size, it may very well be so. But not if the substitution is of a mere equivalent in function.

For example: An obvious mechanical equivalent of the spring in a clock movement is the weight. But the substitution of a weight for the mainspring in the defendant's clock movement, or for the "going barrel" or "internal gear" arrangement of the complainant's clock movement would render it impossible to make a "small clock" out of either of these movements, no matter how the train might be "divided" or arranged.

And so by the substitution of the defendant's mainspring arrangement for the complicated "internal gear" of the complainant's movement, although in general function they are the same, the space they respectively occupy is very different, and the resultant effect upon the shape of the clock is correspondingly unlike. The defendant's clock gains in simplicity but loses in size of movement.

The complainant's movement, owing to the peculiar construction of the spring arrangement, which was the subject of the original patent, is brought within a circular space concentric with its center wheel and dial plate.

But this is not possible with the defendant's movement. That must have additional space for its mainspring and main wheel, which cannot be made concentric with its center wheel and dial-plate.

And, therefore, we submit that the patentee's "division of the train," giving to the term the sense claimed for it by the complainant, requires, for the patentable result claimed for it, a train such as that which the patentee describes as of his invention.

And such a train, it is conceded, the defendant's clock has not.

"Cr. Int. 34. Do you find any such train, composed of such parts, in defendant's clock?

Ans. No."

J. Shepard, fol. 61.

2. The train of "*three wheels*" which the patentee adopted for his movement was not patentable as his "invention." It was simply the result of calculation, with the rules for which any competent clock mechanic is supposed to be familiar.

If the patentee, who is claimed to be a skillful clock mechanic, had supposed that he had made a "discovery" in this respect, and that it was anything new in clock mechanics to provide a movement with a train of *three* wheels instead of one, or two, or any other desired number, it is simply incredible that he should not have indicated that supposition in his original application for a patent.

And the fact that his original patent does not contain a hint of any such supposition, but, on the contrary, by its drawings does show that the number of wheels in the train was regarded by him with indifference, affords evidence that cannot be overcome that he had no idea, at that time, of claiming any such thing as of his "invention," because he knew that he had done nothing in this respect that any other competent clock mechanic could not have done just as readily.

And that this is so the evidence in this record conclusively shows.

Mr. Earle the expert (fol. 222) says, and no attempt is made to controvert the statement:

"The number of wheels and pinions in a train of clock

gearing is simply a matter of convenience and mathematical calculation. There are no better established mathematical rules than those for calculating trains for gearing, that is to say, having as the starting point the one revolution of the centre shaft given, a certain number of teeth in the escape or crown wheel, and a certain number of beats in the pendulum, the intermediate gearing between the center shaft and the crown wheel is a mere matter of calculation and convenience—it may be one, two, three, four, and so on *ad libitum*."

And this statement Mr. Earle fortifies by illustrative models demonstrating its correctness and showing how the same result may be accomplished by various trains having differing numbers of wheels, the clock maker selecting that most convenient for his purpose.

See his testimony with accompanying exhibits, fols. 30–35.

And he finally shows that the rule for calculating the trains of clock gearing, with which the clock mechanic is familiar, and which is fully given in various manuals of the art and particularly in *Reid's Treatise*, which was published as long ago as 1826, will, upon the data present to the patentee Hotchkiss when constructing the movement for his clock, bring out the precise train, that is, three wheels with the same number of teeth and of the same size, which is claimed by the reissued patent to be of his discovery and invention.

See further testimony of Mr. Earle, fols. 271–276.

To this testimony of *Mr. Earle*, *Mr. Shepard*, complainant's expert, makes no reply.

The only reply made by the other expert, *Mr. Terry*, is at fol. 103, to the effect that "the tables in Reid relate to the number *of teeth* in the wheels and leaves in the pinions for producing a given number of turns of the escape-wheel arbor," but do not determine the number *of wheels* that should be in the train. That is, that, notwithstanding the rule in Reid, the clock maker has got to determine the number of wheels he will have in his train for himself.

Of course he has. Until the clock maker has determined upon the kind of clock he will make no one can tell what kind of train he will need to move it.

But what Reid tells him is, that whatever number of wheels he chooses to have for his train (and this number he cannot determine until he has ascertained the space he will have and the kind of teeth he will want), he can, by following the rule given, construct those wheels so as to produce his desired result.

Manifestly, if this is so, there is no such thing as "invention" in determining upon the number of wheels that shall compose the train. It is purely mechanical judgment.

In cross-examination of *Mr. Earle* (fol. 280), complain-

ant's counsel intimate that Mr. Hotchkiss may have hit upon the train which he adopted "in utter ignorance of Reid," and by such experiment as we have indicated.

If he did there could be no "invention" or "discovery" in it.

But the facts afford no ground for any such hypothesis. If he had regarded himself as the discoverer of a *three wheel train*, he could not have failed to assert his title to the invention when he applied for his patent, however mistaken he might have been in making such a claim.

His silence indicates very surely that when he made up the train for his clock he availed himself of Reid's rule at once, and saved himself the labor of any experiments by computing his train in the ordinary way, and which was undoubtedly as familiar to him as the rule of three in arithmetic.

And it is because the clock maker has had these various trains to select from for his movements that three-wheeled trains have not been so commonly employed as trains of a lesser number. For the only advantage of a three wheeled train is in its economy of space, and it has only been within the past few years that there has been a fashion for small common clocks, rendering this economy of space desirable.

Earle, fol. 283.